Transaction Cost Economics, Firm Power, and Negotiation Strategies: An Empirical Study of Buyer-Supplier Relationships in the Oil and Gas Industry

By

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Abstract

There are two main research purposes in this dissertation.

First, it aims to refine transaction cost economics (TCE) by including the scope condition of power structure in the TCE framework. This study develops a model based on TCE and inter-firm power theory. It proposes that power structure moderates the effect of specific investments on governance modes.

Second, this study investigates the interplay of governance modes and negotiation strategies. Building on TCE and negotiation theory, the study proposes that the interaction between governance modes and negotiation strategies influences the performance of relationship.

The hypotheses were empirically tested on a sample of 198 inter-firm relationships in the Norwegian oil and gas industry. Data were collected through a survey of oil and gas supplier firms

With regard to the refinement of TCE, the results yielded mixed support for the hypotheses, indicating that the TCE prediction does not work well for all types of firms. First, it works well for firms with low power in asymmetric-power relationships. Second, it works better for firms in asymmetric-power relationships than for firms in symmetric-power relationships. Third, TCE works better for firms in no-interdependent relationships than for firms in mutual-dependent relationships.

With regard to the interplay of governance modes and negotiation strategies, the hypotheses were partly supported. First, the results indicated that problem-solving negotiation strategy enhances the positive effect of centralization on end-product enhancement outcomes. Second, contrary to expectation, information exchange was found to hinder the positive effect of problem-solving negotiation strategy on the same outcomes.

The findings indicate that (a) power structure should be included in the TCE framework to improve the prediction ability of TCE and (b) relationship performance can be explained by the interplay of governance modes and negotiation strategies. One finding, however, raises a new question: to what extent does the firm's use of information exchange (various types of information) have a negative moderating effect on the association between problem-solving negotiation strategy and end-product enhancement outcomes?

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1. Introduction

This dissertation has two main objectives. First, it aims to refine transaction cost economics (TCE) (Williamson, 1975) by including the scope condition of power structure in the TCE framework. Second, this research aims to investigate the possible synergistic effects of governance structure and negotiation strategy on relationship performance.

1.1. Background and significance

Increasingly globalized and competitive markets, along with higher customer expectations, have encouraged firms to collaborate with other firms (Tseng & Chen, 2013). Management of inter-firm relationships has become increasing complex (Liu & Sharma, 2011). Firm managers have to evaluate and decide strategically what forms of cooperation they should use (i.e., firm boundary decisions) (Gulbrandsen, Sandvik, & Haugland, 2009).

There are several theories devoted to explaining organizational boundary decisions, including the resource-based view (Barney, 1991; Das & Teng, 2000; Peteraf, 1993), TCE, and agency theory (Jensen & Meckling, 1976). Of these perspectives, the most important is TCE.

The awarding of the 2009 Nobel Prize in Economic Science to Oliver Williamson provided strong evidence that TCE has been an important and leading theory for understanding economic organization during the last three decades. Many empirical studies have applied TCE in various disciplines (Geyskens, Steenkamp, & Kumar, 2006), including economics, organization, law, sociology, marketing, finance, accounting, and operations management.

Although TCE has been recognized for its outstanding contribution to the field of economics, it has also been subject to wide-ranging criticism (e.g., Bradach & Eccles, 1989; Powell, 1990; Ring & Van de Ven, 1992; Gulati, 1995; Dyer & Singh, 1998). Of all the empirical research reviews of TCE, the work of David and Han (2004) seems to be the most reliable, due to its use of systematic selection and evaluation criteria. In their review, TCE received an overall support of 47 percent. Why does TCE receive mixed support? In answer to this question, David and Han (2004) suggested that future empirical research could refine TCE by specifying "scope conditions," (p. 54) so that researchers would understand "the conditions under which the theory works and under which it does not." Therefore, the challenge for the researcher is to contribute to the field by identifying the scope conditions of TCE.

A common tenet of TCE is that a firm makes specific investments tailored to its partner firm to achieve value propositions and achieve positions of competitive advantage (Ghosh & John, 1999). However, the investing firm exposes itself to risk as specific investments create a lock-in situation for the firm; such investments cannot be easily redeployed in other relationships without a substantial sacrifice of productive value (Williamson, 1981, 1985). This enables the receiving firm (a partner firm) to behave opportunistically. To safeguard assets at risk, TCE suggests that the investing firm needs to establish hierarchical governance (a more integrated contract). However, an investing firm does not always to choose to employ hierarchical governance (Shervani, Frazier, & Challagalla, 2007) or have the ability to organize the exchange relationship in the desired manner (Heide & John, 1992). Therefore, this study considers the particular scope condition of power structure. Kim (2000) claimed that inter-firm power and its use play a key role in management of inter-firm relationships.

It may be argued that TCE takes power structure into consideration when it claims that transacting parties are far-sighted and anticipate potential dependence conditions at the beginning of their relationship (Williamson, 1991a; 1999) Transacting parties solve the dependence problem ex ante when designing their governance structure or premiums. However, Buvik and Reve (2002) contend, "it is often difficult for the transacting parties to estimate the power-dependence structure in the first place and to predict possible changes over time" (p. 263). This dissertation supports the view that inter-firm power plays a modest role in the TCE perspective, and that power structure should be emphasized more explicitly in TCE. This dissertation aims to contribute to this line of research.

Inter-firm power (dependence theory) is not a new concept. The first empirical studies on inter-firm power were published in the early 1970s (e.g., Hunt & Nevin, 1974). In the past four decades, inter-firm power has been studied extensively in the area of sales and distribution channels (e.g., El-Ansari & Stern, 1972; Frazier, 1983b; Gaski & Nevin, 1985; Hunt & Nevin, 1974). Some empirical studies have attempted to integrate power structure into the TCE framework; their findings suggest that power structure moderates the TCE predictions. They found that in power relationships, hierarchical governance may not be chosen by firm managers, despite the presence of specific investments. Nevertheless, these previous studies leave some gaps, since they do not simultaneously include all types of power structures. For example, Buvik and Reve's (2001) study examines only symmetric-power relationships; in another study (2002), they examine only asymmetric-power relationships. Heide and John (1988) and Shervani et al. (2007) investigate only the effect of asymmetric power, leaving out

symmetric power structures. The aim of this study is to include all major types of power structures and investigate how different power structures may impact the TCE predictions. It is common to classify power structures as asymmetric and symmetric. Symmetric-power relationships can further be divided into mutual-dependent relationships and no-interdependent relationships. Since firms make different decisions and behave differently towards their exchange partner in different power structures (Nyaga, Lynch, Marshall, & Ambrose, 2013 power structure may in fact limit the ability of TCE to correctly predict governance structures.

In addition to studying the determinants of governance mechanisms, TCE researchers have investigated the effect of governance mechanisms on relationship performance. TCE suggests that the most suitable governance mechanism is the one that maximizes efficiency in carrying out specific investments (Williamson, 1985, 1991). Following this logic, firms start to collaborate with other firms when that collaboration enables them to lower costs or increase profits. Therefore, inter-firm relationships can be successful when they organize their activities in a way that minimizes both production and transaction costs. Many empirical researchers have found that governance modes influence inter-firm performance (e.g., Cannon, Achrol, & Gundlach, 2000; Corsten & Kumar, 2005; Ghosh & John, 2005; Jap & Ganesan, 2000).

In addition to the structural dimension (i.e., governance mechanisms) that has been suggested as the explanation of performance of inter-firm relationship, the process (or behavioural) dimension has been shown to influence the success of the collaboration. Negotiation seems to be particularly relevant, since many researchers (e.g. Ganesan, 1993; Graham, 1986; Rinehart & Page, 1992) have found empirically that negotiations have a significant impact on relationship performance. Firms negotiate with their partner firms to secure better exchange conditions (e.g., price, date of delivery, and guaranteed warranties), as firms experience increasing performance pressures. The subject of negotiation management has therefore been increasing in importance. (Herbst, Voeth, & Meister, 2011)

Negotiation strategies are styles of negotiating. Negotiation strategies for effecting relationship outcomes have been hypothesized and empirically supported. When firms use an aggressive negotiation strategy (coercive strategy), their partners perceive their action as exploitive behaviour (Frazier & Summer, 1984) and become more inflexible in their views, leading to more problems and less conflict resolution (Cadotte & Stern, 1979). By using problem-solving strategies, firms indicate they will accommodate their partners' concerns and are willing to

work toward problem resolution. Their action results in profits and a greater satisfaction with the negotiation (e.g., Clopton, 1984; Graham, 1986; Pruitt, 1981).

Both governance mechanisms and negotiation strategies have been tested with regard to their influence on relationship performance. A few empirical studies have merged these two concepts –i.e., Schurr and Ozanne (1985), Ness and Haugland (2005), Ness (2009); Lumineau and Henderson (2009). There is a need for more empirical research that combines these two theories. Furthermore, these previous studies are limited in that they do not aim to explain relationship performance, but instead investigate the individual influence between governance mechanisms and negotiations. Therefore, the second purpose of this dissertation is to test the interaction effect of governance mechanisms and negotiation strategies on relationship performance. This study posits that firm managers must acknowledge that different types of governance modes may require the use of different types of negotiating strategies to achieve specific goals (Das & Kumar, 2011).

1.2. Positioning and contribution of the study

This study contributes both theoretically and managerially. With regard to theoretical contribution, it contributes to the literature in two ways.

First, this study contributes to the existing TCE literature by adding all types of power structure to the TCE framework. It takes the position that it is necessary to include power structure in addition to the common transaction dimension of specific investments, to achieve a more complete understanding of firm boundary decisions. This study responds to a call for more empirical research focusing on contextual variables, according to the claim of David and Han (2004) that finding such contextual variables "would shift the debate from one of empirical 'success vs. non-success' to one of 'success under certain circumstances'" (p. 55). Accordingly, the following research questions will be answered by this dissertation:

- *To what degree does power structure influence the TCE framework?*
- *In various types of power structures, how do relationships between specific investments and governance modes behave?*

Second, this dissertation adds to the existing literature on inter-organizational relations by exploring the interaction effect of governance mechanisms (structural dimension) and negotiation strategies (behavioural dimension) on relationship performance. This study takes the position that it is necessary to take into account the interplay of these two theoretical

perspectives to enhance understanding of the relationship performance. Accordingly, the following research question will be answered by this dissertation:

- *What is the relationship between governance modes and negotiation strategies in explaining relationship performance?*

With regard to managerial contribution, this study provides appropriate strategies for managers in two aspects. The first is in the structural aspect and is particularly appropriate for firm managers who want to succeed in asymmetric-power relationships. This study suggests that firm managers should identify their type of firm power (i.e., whether their firm is the stronger firm or the weaker firm in the asymmetric-power relationship). Managers of stronger firms can use market governance to coordinate with their partner firms and use their firm power to safeguard their specific investments. By doing so, stronger firms can avoid the high cost of hierarchical governance. Managers of weaker firms should use formalization to safeguard their specific investments. This suggestion supports the logic of TCE.

The second managerial contribution focuses on both structural and process aspects of inter-firm management. It provides useful knowledge for firm managers on choices of negotiation style. The results suggest that problem-solving negotiation strategy enhances the positive effect of centralization on end-product enhancement outcomes (Ghosh & John, 2005). Firm managers who aim to achieve a differentiation advantage should collaborate with their partner firms under centralization and use a problem-solving negotiation strategy. However, since information exchange was found to hinder the positive effect of problem-solving negotiation strategy on these outcomes, this study suggests that firm managers use caution in exchanging information with partner firms.

1.3. Dissertation outline

The remainder of this dissertation is organized as follows: Chapter 2 provides the theoretical background and review of empirical studies in the field of inter-organizational governance, inter-organizational power, and the negotiation strategies; Chapter 3 describes the research model and hypothesis development; Chapter 4 presents the research design and method; Chapter 5 presents data analysis and hypothesis testing; Chapter 6 presents the results; and Chapter 7 presents the discussion.

2. Theoretical background and literature review

The purpose of this chapter is to present the theoretical background and review of empirical studies. Investigations of the extent to which power structure affects the predictions of TCE and the possible synergistic effects of governance mechanisms and negotiation strategies on relationship performance are the main objectives of this study. In accordance with these two objectives, this study relies heavily on (a) transaction cost theory, (b) relational contracting theory (RCT), (c) inter-firm power theory, and (d) negotiation theory.

The first research question aims to determine the impact of power structure on the relationship between specific investments and governance modes. TCE provides the main framework for the investigation and inter-firm power theory describes the power structure that moderates the effect of specific investments on governance modes. The second research question aims to investigate whether relationship performance can be explained by the interaction of governance modes and negotiation strategies. TCE and RCT explain the properties of various governance modes, and negotiation theory explains how the process of negotiation works.

Section 2.1 reviews the governance of inter-firm exchange by describing the transaction cost framework and relational contracting theory. Section 2.2 examines inter-firm power. Section 2.3 outlines negotiation strategies. Section 2.4 presents the summary of the theoretical background, and Section 2.5 presents empirical studies and findings that are relevant to the positioning of this study, research questions, and hypotheses development.

2.1. Inter-organizational governance

This section details the theoretical background of governance mechanisms. Governance has traditionally been defined as a mode of organizing transactions (Williamson & Ouchi, 1981). It is the control structure, or the formal or informal rules of exchange (Ghosh & John, 1999). Because of the broadness of this definition, firms have adopted many different mechanisms to establish, structure, monitor, and enforce transactions with their exchange partners. Various theoretical frameworks make various assumptions about the nature of governance modes. This research focuses on two main perspectives of governance: TCE and RCT. The TCE perspective was developed from the concept of market and hierarchy developed by Coase (1937) and operationalized by Williamson (1975). With regard to RCT, Macniel (1978, 1980) developed a typology of discrete versus relation exchange.

Section 2.1.1 describes transaction cost economics. Section 2.1.2 outlines relational contracting theory. Section 2.1.3 examines plural forms of governance, and Section 2.1.4 summarizes the relevance of governance structures.

2.1.1. Transaction cost economics

The examination by Coase (1937) of market and hierarchy seems to be the first and most widely accepted study on governance mechanisms. It suggests that the mode of governance between markets and hierarchies is determined by differences in transaction costs. In a firm, hierarchical governance is used because costs of economic exchange in the market governance exceed the costs of organizing it within a firm. Bradach and Eccles (1989) review many scholarly works on the insight of Coase, and conclude the basic argument is that "transactions will be governed by the institutional arrangement that is most efficient" (p. 99).

Dahlstrom and Nygaard (1999) have defined transaction costs as "expenditures associated with an economic exchange that vary independently of competitive prices and the product exchanged" (p. 161). Williamson (1985) shows that transaction costs are composed of ex ante costs and ex post costs. Ex ante costs are costs associated with bargaining costs and ex post costs are associated with monitoring and maladaptation. Based on the research of Dahlstrom and Nygaard (1999), three costs can be identified:

- *Bargaining costs* are expenditures associated with negotiation among exchange partners; they are made periodically to modify contractual terms (Milgrom & Roberts, 1990).
- *Monitoring costs* are expenditures paid for guaranteeing the fulfillment of contractual obligations or ensuring that exchange partners act in the best interest of all parties (Lal, 1990;).
- *Maladaptation costs* are expenditures associated with communication and coordination failures among exchange partners that occur, for example, when a product's information does not accompany the delivery (Reve, 1986).

Of the many studies of transaction costs, Williamson's (1985) TCE has been the primary means of operationalization. Williamson (1975) advanced the theory of Coase (1937) about the nature of the firm. TCE explicitly considers the efficiency implications of adopting alternative forms of governance and suggests three modes of governance on the continuum of the exchange: market, hybrid, and hierarchy (as shown in Figure 2.1). The central question of TCE is whether

a transaction is more efficiently performed inside a firm (hierarchical governance) or outside a firm by autonomous exchange parties (market governance) (Geyskens et al., 2006).

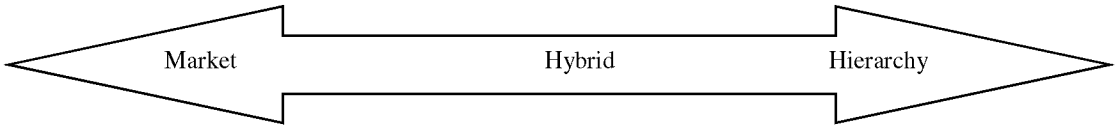

Figure 2.1 The continuum of exchange and mode of governance (Williamson, 1985)

2.1.1.1. Market governance

Market governance corresponds to formal contracts, representing promises or obligations to perform particular actions in the future (Macneil, 1978). It defines remedies for foreseeable contingencies and specifies processes for resolving unforeseeable outcomes (Poppo & Zenger, 2002). The more sophisticated the contract; the more precise the promises, obligations, and processes for dispute resolution, in which the identities of the transacting partners are irrelevant and no dependency relation exists between them (i.e., each exchange partner is autonomous). It is therefore easy for firms to switch exchange partners with little penalty because other prospective partners offer virtually identical resources (Dyer & Singh, 1998). Transactions are governed by formal terms, interpreted in a legalistic way, and characterized by "hard bargaining" between parties. Market governance occurs in many forms in inter-organizational relationships, such as the industrial sourcing situation, in which a buyer (manufacturer) acquires subassembly components from independent (external) suppliers (Heide, 2003).

Market governance benefits firms by providing the cost advantages of external specialists and enabling firms to focus on their core business (Quinn & Hilmer, 1994). However, Dyer and Singh (1998) suggest that market relationships are not able to gain relational rent because "there is nothing idiosyncratic about the exchange relationship that enables the two parties to generate profits above and beyond what other seller-buyer combinations can generate"(p. 662).

2.1.1.2. Hierarchical governance

Hierarchy governance (or internal organization) is a governance structure that provides more flexibility and adaptation than market governance. Adaptation to disturbances comes in the form of fiat, meaning that parties in hierarchies resolve disputes internally, rather than relying on the courts. This form of governance is supported by means of an authority structure, providing one partner with the ability to develop rules and impose decisions on others.

2.1.1.3. Hybrid governance

Hybrid governance (ideal type) (Bradach & Eccles, 1989) is characterized as being in between markets and hierarchies. It corresponds to neoclassical law, which is more adaptable and elastic than the classical law used in market governance, but less adaptable than internal organization or hierarchies. Williamson and Ghani (2012) explain that hybrid governance mitigates contractual hazards that would increase under market governance (due to specific investments and uncertainty) without creating the additional costs of bureaucracy and the loss of incentive intensity that usually occurs under hierarchical governance. Mechanisms that operate under hybrid governance include penalties for breach of contract, information disclosure and verification, and private arbitration before resorting to the courts. In hybrid form, exchange parties maintain autonomy while being mutually dependent to a non-slight degree. The identity of the exchange parties matters; one partner cannot be replaced, without cost, by the other.

2.1.1.4. TCE assumptions

TCE is based on five assumptions: (a) bounded rationality, (b) opportunism, (c) specific investments, (d) uncertainty, and (e) transaction frequency. The first two assumptions pertain to human behaviours. The latter three are the primary transaction attributes.

Bounded rationality refers to the extent to which decision makers have constraints on their cognitive capabilities and limits on their rationality. This assumption has important implications for contracting parties, in that firm managers are unable to design comprehensive contracts, accounting for all possible contingencies, due to their cognitive limitations.

Opportunism is defined as "self-interest seeking with guile" (Williamson, 1985, p. 47). TCE assumes that all economic actors are opportunistic, meaning that they may cheat, shirk, distort information, mislead partners, provide substandard products and services, or appropriate the critical resources of partners (Das & Teng, 1998). In fact, not all managers act opportunistically, but it is impossible to know who would or would not; it is only known that there is a risk of such behaviour.

Specific investments (or ***asset specificity)*** refers to the degree to which the assets that are tailored to a given transaction cannot easily be redeployed to "alternative uses and by alternative users without sacrifice of productive value" (Williamson, 1991b, p. 282). Firms make specific investments with the hopes of, for example, reducing the costs of production or increasing their sales.

Williamson (1985) identifies three forms of specific investments: site specificity, physical asset specificity, and human asset specificity. However, previous research includes dedicated assets that do not belong to these three categories.

- *Site specificity* refers to the situation in which successive production stages that are immobile in nature are located close to one another. Dyer (1996) suggests that site-specific investments substantially reduce transportation and inventory costs, and lower the cost of coordinating activities.
- *Physical asset specificity* refers to transaction-specific investments (such as customized machinery) that tailor processes or operations to particular exchange partners. Physical asset specificity leads to product differentiation and may improve quality by increasing the degree of product fit or integrity (Clark & Fujimoto, 1991; Nishiguchi, 1994).
- *Human asset specificity* refers to transaction-specific "know-how" accumulated by transaction makers through long-standing relationships (Dyer & Singh, 1998). An example of a human asset-specific investment by a supplying firm is the familiarity of its computer programmers with customer systems. As exchange partners work together, they accumulate specialized information, language, and knowledge. Moreover, they communicate more efficiently and effectively, thereby reducing errors and delivery time, and enhancing quality (Asanuma, 1989; Dyer, 1996).
- *Dedicated assets* refer to transaction-specific investments that do not have site, physical, or human asset specificity, including, for example, idiosyncratic investments in brand name capital. This dimension has received limited attention in the extant literature.

Uncertainty is a property of the environment where exchange takes place. It occurs in two forms: (a) environmental or external uncertainty and (b) behavioural or internal uncertainty (Alchian & Demsetz, 1972).

- *Environmental or external uncertainty* occurs when the relevant contingencies surrounding an exchange are too unpredictable to be specified ex ante in a contract.
- *Behavioural or internal uncertainty* is a problem of a performance evaluation or difficulty in ensuring ex post whether contractual compliance is taking place (Geyskens et al., 2006).

Transaction frequency refers to the extent to which transactions recur. TCE suggests that when asset-specific transaction recurs, it requires a constant monitoring effort. The overhead cost of

hierarchical governance will be easier to recover than the cost of market governance. Therefore, in the presence of specific investments, transaction frequency pushes transactions away from market, into hierarchy. Transaction frequency has received limited attention in TCE; Geyskens et al. (2006) note that they did not include transaction frequency in their meta-analysis because of the lack of studies that have included this assumption.

2.1.1.5. Logic of TCE

TCE provides "rational economic reasons" for crafting or predicting the governance mechanism (Williamson, 1985, p. 52) as transactions are different in their attributes and aligned with governance modes in a discriminating way. This means that, among the three modes, any mode of governance that minimizes the transaction costs becomes preferred over other modes.

The assumption of bounded rationality has implications for firm managers who are trying to create complex contracts that account for all possible contingencies. It dictates that complex contracts are unavoidably incomplete. This becomes problematic in uncertain environments. Nevertheless, as long as firms do not make specific investments, firm managers can use many short-term contracts (i.e., market governance) to reduce the risk of any hidden exchange hazards (Williamson & Ghani, 2012).

The assumption of opportunism has implications for firm managers whose partner firms violate contracts both actively and passively (Wathne & Heide, 2000). There will be costs of monitoring. If such costs are very high, and as long as firms do not make specific investments, there is no lock-in effect or safeguarding problem. Firm managers can terminate the contracts and find new partner firms.

However, if firms make specific investments, the investing firms will become dependent on the receiving firms. There will be switching costs when firms terminate their inter-firm relationships because such investments have little or no value outside the relationship (i.e., lock-in effect) (Barney & Ouchi, 1986). Without dependence due to specific investments, market governance would be efficient enough (Williamson & Ghani, 2012). Furthermore, in market governance, investing firms may be subject to opportunistic behaviors of receiving firms because market competition will not restrain opportunistic exploitation (Geyskens et al., 2006). Thus, investing firms will need to safeguard their specific investments by establishing the governance mechanisms that ensure the return on their specific investments i.e., hybrid or hierarchical governance. It is noteworthy that in cases of hierarchical governance, bureaucratic

costs may increase as parties become more integrated. However, these costs will be offset by the gains from bilateral adaptation obtained from the new form.

The occurrence of specific investments transforms a governance mechanism from market governance (in which the identity of parties is irrelevant) into hybrid or hierarchical governance (in which the identity of exchange partners is important) (Williamson, 1991b).

With regard to the property of uncertainty, when circumstances cannot be defined ex ante and performance cannot be easily evaluated ex post, the effect of cognitive limitation becomes problematic (Rindfleisch & Heide, 1997). Environmental uncertainty may cause an adaptation problem that makes it difficult to adjust agreements, thereby raising transaction costs. According to original TCE theory, such problems can be addressed through hierarchical governance because parties in hierarchies resolve disputes internally, rather than relying on the courts.

The effect of uncertainty on the choice of governance mode is conditional. The original theory of TCE suggests that the association between uncertainty and specific investments is the key determinant of governance choice, rather than the individual variable. When specific investments are present at a slight degree, market governance should be employed, whatever the degree of uncertainty, because continuity between exchange partners matters little and new transaction arrangements can be easily arranged if necessary (Williamson, 1985, p. 59).

However, the argument of many researchers—that a high degree of environmental uncertainty also encourages firms to maintain flexibility—is contradictory to the characteristics of hierarchical governance. For example, Klein (1989) mentions that the concept of uncertainty is very broad. Its various facets lead to both a desire for flexibility (market governance) and motivation to reduce transaction costs (hierarchy).

Walker and Weber's (1984) influential classification of environmental uncertainty provides a good explanation of this concept. The authors distinguish and identify two types of environmental uncertainty, i.e., volume uncertainty and technological uncertainty:

- *Volume uncertainty* is defined as the inability to accurately forecast the volume requirements in a relationship (Walker & Weber, 1984). When volume uncertainty occurs, supplying partners may incur the problems of excess capacity or unexpected production costs, and buying partners may face stock-outs or excess inventory. Such problems can be addressed more efficiently if exchange partners coordinate variations

in a hierarchically organized production stream. Volume uncertainty, therefore, increases the likelihood of hierarchical, rather than market, governance.

- *Technological uncertainty* is defined as the inability to accurately forecast the technological requirements in a relationship (Walker & Weber, 1984). This type of uncertainty is caused by the unpredictable changes in the standards or specifications of technology. When technological uncertainty occurs, as the result of reliance on market governance, firms should terminate the existing relationship and switch to new exchange partners who have technological capabilities that are more appropriate (Balakrishnan & Wernerfelt, 1986).

2.1.1.6. Summary of TCE and its relation to research questions

The central prediction of TCE is the identification of the governance structure (market governance or hierarchical) that performs a transaction more efficiently. TCE assumes that the rationality of transactors is bounded and that they are risk neutral and opportunistic. Furthermore, market governance is assumed to be more efficient than hierarchical governance due to the benefits of competition. However, some transaction dimensions—specific investment, uncertainty, and transaction frequency—increase transaction costs and cause market failure, which makes hierarchical governance more efficient than market governance. Accordingly, economic organization is an effort to align transactions with governance structure in a discriminating way (Williamson, 1991).

This study proposes that inter-firm power structure may have implications that TCE does not take into account. TCE (Williamson, 1991a) deals with the issue of inter-firm powers by claiming that firm managers are farsighted and anticipate the potential problems of inter-firm power. Such problems are solved ex ante when managers design appropriate governance mechanisms or premiums for hazards.

However, if investing firms are weaker firms and their partners are stronger firms (according to their asymmetric-power relationships), it will be difficult for investing firms to influence their partners to use the more integrated governance modes; they are not the parties that decide the trade terms. Heide and John (1988) suggest that the power structure of exchange partner firms affects the firm's ability to design the governance modes. Because of ability limitation, weaker firms may not be able to influence their partner firms to establish integrated governance to safeguard their specific investments. They may need to use other types of governance mechanisms rather than hierarchical governance. Section 2.2 describes how inter-firm power

highlights the importance of asymmetric and symmetric-power relationships. Further, in Chapter 3, hypotheses regarding the effects of power structure on the TCE framework are developed.

2.1.2. Relational contracting theory

Based partly on Macaulay's 1963 study of non-contractual relations, Macneil (1978, 1980) proposes relational contracting theory (RCT) that characterizes the buyer-supplier relationship. RCT views relationships between firms on a continuum, ranging from discrete transactions to relational exchange, as depicted in Figure 2.2. Relationships vary according to the extent of bonding between partner firms.

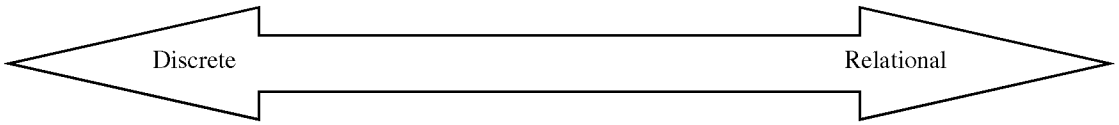

Figure 2.2 The continuum of exchange and mode of governance (Macneil, 1978, 1980)

2.1.2.1. Discrete exchange

Consistent with the assumptions of neoclassical economic theory and analogous to market governance in TCE, discrete exchange assumes individual transactions to (a) be independent of past and future relations between partner firms and (b) constitute nothing more than the transfer of ownership to products or services (Goldberg, 1976). Exchange partners under discrete exchange remain autonomous and maintain the vigorous desire to reach their goal, which may create conflicts of interest and discourage unity of partner firms. Partner firms use economic and legal sanctions, or even power, to enforce contractual obligations.

In general, discrete exchange is used when products or service performances are obvious and can be easily evaluated and carted away. Exchange partners can pay little attention to measurement and specifications. Payment is usually made with cash. Dwyer, Schurr, and Oh (1987) show an example of this discrete transaction as "a one-time purchase of unbranded gasoline out-of-town at an independent station paid for with cash" (p. 12).

2.1.2.2. Relational exchange

In contrast to discrete exchange, relational exchange refers to an exchange that occurs over time, reflecting an ongoing process (Macneil, 1978, 1980). Each individual transaction must be viewed in terms of its history and anticipated future. Partner firms are expected to receive complex, personal, and noneconomic satisfactions and engage in social exchange.
Since relational governance is a non-juridical mechanism, legal enforcement is not easy. However, this mode of governance operates as a self-enforcing safeguard by virtue of many informal and diverse components, such as mutual dependence, trust, and norms.

Relational mechanisms can be explained according to two perspectives: economic and sociological. Economists emphasize the rational or calculative origins. Partner firms expect payoffs from the future and are motivated to deliver present collaboration (Axelrod, 1984). The value of a future relationship is sufficient to discourage both partner firms to break a promise or make short-term gains (Poppo & Zenger, 2002; Telser, 1980).

Sociologists emphasize relational norms generated in a historical and social context in which transactions take place between highly committed exchange partners (Uzzi, 1997). Norms are expected behaviors, designed to enhance the well-being of the relationship as a whole (Dwyer et al., 1987; Kaufmann & Stern, 1988; Heide & John, 1992). The acceptance of norms by all exchange parties is required to render norms (Cannon et al., 2000).

Macneil (1980, 1983) proposes ten contract norms that emerge from the patterns of basic contractual behaviour: (a) role integrity, (b) mutuality, (c) implementation of planning, (d) effectuation of consent, (e) flexibility, (f) contractual solidarity, (g) the linking norms of restitution, reliance, and expectation interests, (h) creation and restraint of power, (i) harmonization with the social matrix, and (j) propriety of means. However, Heide and John (1992), and Poppo and Zenger (2002) suggest four norms that are of particular importance in cooperative relationships: flexibility, solidarity, information exchange, and restrain in the use of power.

- *Flexibility* is the attitude among parties that an agreement is but a starting point to be modified as the market, the exchange relationship, and the fortunes of the parties evolve.
- *Solidarity* is the extent to which parties believe that success comes from working cooperatively together versus competing against one another. It dictates that parties stand by one another in the face of adversity and the "ups and downs" of marketplace competition.

- *Information exchange* occurs when parties expect to provide information proactively that is useful to the partners.
- *Restraint in the use of power* is forbearance from taking advantage of one's bargaining position in an exchange. It reflects the view that the use of power not only exacerbates conflict over time but also undermines mutuality and solidarity, opening the door to opportunism.

2.1.2.3. Incorporating relational governance into TCE and its relation to research questions

Recent research on TCE incorporates relational governance into the TCE framework (Geyskens et al., 2006). Although TCE's alternative forms of governance are widely recognized, TCE has been subject to criticism. TCE traditionally describes departures from a market-based exchange to hierarchical governance. Some researchers argue that it overstates the exchange partners' desirability for integration to protect against transaction hazards (Poppo & Zenger, 2002). Moreover, it also overemphasizes the ability of hierarchical governance to govern relationships (Maitland, Bryson, & Van de Ven, 1985) and fails to account for the social structures within which exchange is embedded (Granovetter, 1985). RCT, therefore, introduces the concept that the departure from market governance, i.e., discrete exchange, is the establishment of relational governance. According to Macneil (1980), "contract without the common needs and tastes created by society is inconceivable […] and contract without social structure is—quite literally—rationally unthinkable" (p. 159).

However, Williamson (1991b) argues that relational governance addresses the problem of uncertainty less effectively than market governance because relational adaptations cannot be made unilaterally, but market adaptations can. Relational adaptations need mutual consent that takes time to acquire, which may not be possible in uncertain environments. The thought piece by Williamson and Ghani (2012) argues that TCE treats calculated risk as a manifestation of trust in commercial transactions, meaning that firms take the risk only if the expected net gains are positive.

This study follows the line of reasoning regarding the incorporation of relational governance into the TCE framework: it views relational norms as an alternative form of governance. With regard to power structure, it proposes that relational norms may be used by weaker firms to safeguard their specific investments since they may not be able to establish a more integrated

mode of governance. The hypotheses regarding this incorporation in all types of power structures are developed in Chapter 3, and tested in Chapter 5.

2.1.3. Plural forms of governance

The presumption of TCE, that the governance continuum runs from markets to hierarchies, may be misleading, because these approaches rest on the premise that market and hierarchy are independent and mutually exclusive means to control the industries. Bradach and Eccles (1989) prove that firms simultaneously employ distinct governance forms for the same function, i.e., the plural form. They suggest that modes of governance can be combined in a variety of ways, just as market and trust are sometimes integrated to govern transactions between partner firms, while franchises (market) and company-owned (hierarchy) units are operated under the same trademark.

Bradach and Eccles (1989) show that the franchising system is an excellent example of the plural form. Franchising systems are composed of company-owned units and franchised units. It is perceived that hierarchical governance is employed in company-owned units. However, in the company-owned unit, some elements of market governance can be found (for example, profit centers and management incentive programs). In contrast, market governance is perceived to be employed in franchised units, as the independent franchisees sign long-term contracts with the franchisers. However, franchisees are not fully independent entrepreneurs. Hierarchical governance is used when franchisers prescribe how franchisees must operate to protect brand value.

Poppo and Zenger (2002) explain the co-existence of relational governance and TCE governance. They suggest that relational governance does not replace market or hierarchy governance, but functions as a complement. They propose that when exchange hazards are present to a high degree, the combination of formal and informal governance may provide greater exchange performance than exclusive reliance on one governance form. According to their proposal, formal safeguards are clearly articulated contractual terms, remedies, and processes of dispute resolution, and informal safeguards are relational norms of flexibility, solidarity, bilateralism, and continuance. Similarly, Dwyer, Schurr, and Oh (1987) argue, "it might be impossible to cover all contingencies in a formal contract for sustained cooperation, but if the partners have trust it may be unnecessary to cover all contingencies" (p. 23).

Poppo and Zenger's (2002) logic is that the early stages are more vulnerable. Exchanges need formal contracts to ensure success through formal specification of a long-term commitment,

and clearly articulated clauses that specify punishments to limit the gains from opportunistic actions. The collaboration in the present helps to build cooperation in the future. The process of developing complex contracts requires exchange partners to make a mutual determination, promoting expectations of cooperation and developing relational governance. In addition, all exchange dimensions prove impossible to specify contractually. When change and conflict arise, relational governance becomes a necessary complement to the adaptive limits of contracts (Macneil, 1978). Specifically, the relational norm of solidarity fosters future exchange because exchange partners have a "keep on with it" attitude that makes partner firms mutually dependent. Therefore, as the contracts become highly customized, relational governance increases the continuance of the relationship and safeguards specific investments from premature and costly termination.

2.2. Inter-organizational power

Inter-organizational power plays a pivotal role in the management of inter-firm relationships. A number of research studies address the issue of inter-firm power (e.g. Belaya, Gagalyuk, & Hanf, 2009). According to the framework of Dwyer et al. (1987), inter-firm power operates closely with bargaining processes in the exploration and expansion phase. Inter-firm power is brought to bear on bargaining, both in the exploration phase and in day-to-day commitment, in the hope that concessions or resources, which exchange partners require, will be granted or obtained. However, exercise of unjust power sources may lead other exchange partners to terminate the association when interdependencies are minimal. The effect of power is a crucial topic for both managers and academics. The purpose of this chapter is to provide the theoretical background of this concept.

2.2.1. What is power?

There are many conceptualizations of power. One of the fundamental determinants of power, according to sociologists, is dependence. Emerson (1962) suggests that the power of *A* over *B* is equal to and based on the dependence of *B* on *A*. Power is not an attribute of the actor but a property of the social relation. Many researchers adopt Emerson's conceptualization and adjust it to their research context. For example, Dwyer (1984) states that dependence and power "rests on the extent to which *B* is dependent on *A* for valued resources" (p. 682).

A research review of the definition of power leads to the conclusion that a firm has power over its partner firm when its partner firm perceives that the firm has expertise, information, attractiveness, a right to prescribe the partner firm's behaviour, or the ability to mediate

punishments and rewards for the partner firm (e.g., French & Raven, 1959; Pfeffer & Salancik, 1978; Wilkinson, 1979; Gaski & Nevin, 1985; Gaski, 1986; Scheer & Stern, 1992). Alternatively, a partner firm is dependent on a firm when a firm possesses valued resources, such as capital, products, services, information, or status (Dwyer et al., 1987; Scheer & Stern, 1992) that create partner firm rewards and benefits that are not easily replaced.

2.2.2. Factors influencing power

Heide and John (1988) suggest four factors that influence power or dependence.

First, dependence is increased if the outcomes obtained from a relationship are important or highly valued or if the exchange magnitude itself is high (i.e., a firm provides a large fraction of partner firm's business). This is consistent with the "sales and profit" approach developed by El-Ansary and Stern (1972). In that approach, the greater the percentage of sales and profit contributed by a firm, the greater a partner firm's dependence on a firm. Many previous studies use the importance or magnitude of exchange to explain the dependence of firms (e.g., El-Ansary & Stern, 1972; Etgar, 1976; Pfeffer & Salancik, 1978; Dickson, 1983).

Second, if outcomes obtained from a relationship are higher or better than outcomes obtained from alternative relationships, dependence is increased. Previous studies use role performance or comparison of outcome levels as the basis of dependence (e.g. Frazier, 1983b; Anderson & Narus, 1984). The concept of role performance, developed by Frazier (1983a), refers to how well a firm fulfills its role in a relationship with its partner firms.

Third, dependence is increased if there are fewer alternative exchange sources. The concentration of exchange or the fraction of business done with a particular partner firm are factors that arise from previous empirical and conceptual studies (e.g., El-Ansary & Stern, 1972; Etgar, 1976; Pfeffer & Salancik, 1978; Dickson, 1983).

Fourth, if there are fewer potential alternative sources of exchange available for replacing a partner firm, it is difficult for a firm to substitute another partner. Dependence is therefore increased. Previous empirical studies use the replaceability of the incumbent partner as a measure of dependence (e.g., El-Ansary & Stern, 1972; Etgar, 1976; Brown, Lusch, & Muehling, 1983; Buchanan, 1992).

2.2.3. Power base

Extant research studies of power share (1959) the power typology developed by French and Raven ((1959). According to this view, power exists in six forms: reward power, coercive power, legitimate power, referent power, and information power. Each form of power is defined by its ability to bring tangible or intangible consequences into use for a target.

Reward power refers to the granting of consequences that a receiving firm regards as desirable, or the withdrawal of consequences that a receiving firm considers as aversive. The use of non-coercive power may take considerable time to implement effectively (Kasulis & Spekman, 1980; Frazier & Summers, 1984). A firm that uses non-coercive power can expect the return use of non-coercive power from its exchange partners, contributing to a supportive exchange atmosphere (Frazier & Rody, 1991).

Coercive power or ***punitive power*** refers to the granting of aversive consequences, or penalties, as well as the withdrawal of desirable consequences (Hinkin & Schriesheim, 1989). A firm might possess destructive resources that can wound partner firms (Molm, 1989). When a firm intentionally inflicts damaging consequences on its partner, the act is defined as punitive action (Lusch, 1976; Gaski & Nevin, 1985). Kumar, Scheer, and Steenkamp (1998) dissect punitive action and use the term "punitive capability" (p. 226) to explain the firm's ability and willingness to deliver negative consequences to its partner. The firm might develop its punitive capability by investing in the systems that control the withdrawal of valued resources or exercising destructive resources and having the will to deliver negative consequences to its partner.

Legitimate power occurs when a firm is perceived to have a right (i.e., a legitimate right), to influence its partner firm, when the partner firm is obligated to comply with this influence. There may not be any granting of direct consequences involved. Legitimate power can be divided into two types: traditional legitimate and legal legitimate (Kasulis & Spekman, 1980). The former refers to the perceived hierarchies in which stronger firms may feel they have legitimate power and consequently can influence certain policies (Stern & El-Ansary, 1977); the latter is based on contractual agreements that all exchange partners make to govern their collaboration, such as franchising agreements between franchisors and franchisees (Stern & El-Ansary, 1977).

Reference power is based on a firm's desire to be closely associated with its partner. Some firms pride themselves on being associated with certain partner firms or brands. Such firms are willing to be influenced by their partners.

Expert power occurs when a firm perceives that its exchange partner is knowledgeable about a certain area, and allows its exchange partner to influence its decision and behaviours.

A firm has ***information power*** over its partner firm when it has the ability to (a) provide information that was previously unavailable to its partner and (b) interpret existing information to be meaningful but yet unknown by its partner (Raven & Kruglanski, 1970).

2.2.4. Contingency of power effect

Positive and negative effects can occur either contingently or non-contingently. Contingent influence occurs when a firm promises or threatens to signal explicitly that it will mediate positive or negative consequences, depending on the response of its partner firm. Non-contingent influence occurs when a firm mediates consequences for its partner unilaterally in the hope that its partner will subsequently behave in the way sought by the firm; the firm exercises resources before its partner complies (Scheer & Stern, 1992).

2.2.5. Power structure and its relation to research questions

Two types of inter-firm relationships can be identified: symmetric-power relationships and asymmetric-power relationships. Power symmetry occurs when both partner firms have the same degree of power; power asymmetry occurs when partner firms have different degrees of power. This power structure affects behaviours and attitudes of firm managers toward their partner firms. (Bacharach & Lawler, 1981; Lawler, 1986). Bilateral deterrence theory (a sociological theory), ably explains the effects of interdependence of exchange partners. It views asymmetric-power relationships as unstable, consistent with extant research findings that show that asymmetric relationships are less stable and less beneficial than symmetric relationships (e.g., Buchanan, 1992; Kumar et al., 1995).

A firm with relatively high power (a stronger firm) is expected to exploit its weaker partner by frequently using coercive power (Bannister, 1969; Robicheaux & El-Ansary, 1975). A firm with relatively low power (a weaker firm), lacking alternatives and status, is prone to have high tolerance for the use of coercive power by its stronger partner and to have minor equity concerns. A weaker firm, therefore, does not (or barely attempts) to retaliate (Bucklin, 1973; Blalock & Wilkin 1979). A firm with high power due to the availability of alternatives and status levels has a low level of tolerance for the use of coercive power (Frazier & Rody, 1991). Many previous empirical studies have shown that the possession of power encourages a firm to act opportunistically by unfairly gaining a share of profit from an exchange (e.g., Roering,

1977; Wilkinson & Kipnis, 1978; Dwyer & Walker, 1981; Kale, 1986; McAlister, Bazerman, & Fader, 1986; Frazier et al., 1989; Frazier & Rody, 1991).

A stronger firm is likely to be able to utilize non-coercive strategies effectively, as it has the prerequisite time and attention from its exchange partner; a weaker firm is likely to be forced to use coercive power more frequently to make its presence felt and demands known, though its effort might be ineffective (Emerson, 1962; Frazier & Rody, 1991).

In line with previous research, this study takes the position that inter-firm power plays a key role in inter-firm relationships. In particular, it shares the view of Heide and John (1998) that power structure influences a firm's ability to choose or design governance mechanisms. It is not always possible for firms to establish the desired mode of governance. Firms need to consider their own power in addition to assessing the transaction dimension. By accounting for power structure, the TCE framework will be complete and will be able to explain all types of firms. Hypotheses based on this logic are developed in Chapter 3.

2.3. Negotiation strategy and its relation to research questions

Negotiation play a key role, particularly in buyer-seller markets (Herbst, Voeth, & Meister, 2011). Negotiation is the fundamental phenomenon in inter-firm relationships (Perdue & Summers, 1991). Zachariassen (2008) claims that communication and negotiation is responsible for most of the success in supply chains. Without negotiation, the supply chain would not exist.

In this study, negotiation is defined as the interaction process through which partner firms establish the terms of a purchase agreement or exchange conditions (for example price or date of delivery). Negotiation strategies are styles of interaction between partner firms. To choose the most appropriate type of negotiation strategies, several researchers, including Thomas (1976), Putnam and Wilson (1982), Pruitt (1983), Pinkley and Northcraft (1994), and Gelfand, Leslie, and Keller (2008), have proposed a typology of negotiation. However, Pruitt's (1983) typology has received strong empirical support both in the field and in laboratory studies (Das & Kumar, 2011; De Dreu, Evers, Beersma, Kluwer & Nauta, 2001; Liu & Sharma, 2011).

Pruitt (1983) advanced the work of Blake and Mouton (1970) and proposed the dual concern model based on two orthogonal dimensions of concern. To decide which strategy to employ to negotiate effectively with other exchange partners, firms should consider two types of concerns: concern about their own outcomes and concern about partner firms' outcomes.

Mapping out high degrees and low degrees for each of these two concerns creates a 2 x 2 matrix of the following negotiation strategies: (a) problem-solving, (b) contending, (c) yielding, and (d) inaction (as depicted in Figure 2.3).

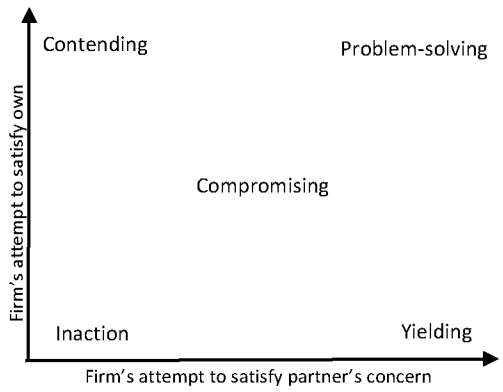

Figure 2.3 Five negotiation strategies

First, firms use a *problem-solving* or *collaborative negotiation strategy* when concerns with both their own and their partners' outcomes are high, i.e., they share responsibilities to reach a mutually beneficial relationship (Day, Michaels, & Perdue, 1988) and take into account the long-term working relationship (Liu & Sharma, 2011). Previous research has found that this strategy positively influences firms' profits and satisfaction (e.g., Ganesan, 1993; Graham, 1986). However, this strategy is most effective when power relationships are equal, interpersonal conflicts are minimal, and long-term relationships are sought (Weitz, 1978).

Second, a *contending* or *aggressive* or *competitive negotiation strategy* stems largely from a zero-sum or win-lose orientation (Clopton, 1984) and represents a "Let's do it my way!" approach (Day, Michaels, & Perdue, 1988). When adopting this strategy, firms desire to win their own concerns at their partner's expense and thus engage in demanding, threatening (Dwyer & Walker, 1981), and inflexible behaviour (Clopton, 1984). This strategy is used in asymmetric-power relationships. In such relationships, a stronger party is mainly concerned with its own interests and exercises its power to gain significant outcomes, neglecting the deteriorating effects on the relationship (Atkin & Rinehart, 2006); subsequently, the stronger party's perspective usually prevails (Das & Kumar, 2011). Aggressive actions from one party are more likely to invite retaliation from the other and lead to distrust, hostility, and negative outcomes in the relationship (Liu & Sharma, 2011). Therefore, this aggressive negotiation strategy seems to be inappropriate in most cases. However, Graham, Kim, Lin, and Robinson

(1988) empirically found that in the Japanese and Korean cultural contexts, aggressive negotiation strategy leads to positive outcomes.

Third, a *yielding, subordinating,* or *accommodative negotiation strategy* occurs when firms desire to satisfy the concerns of the other without attending to their own concerns (Day et al., 1988). Normally an accommodative party is the weaker party in the relationship. This weaker party receives the requests of the stronger party only because the stronger party has little to lose (Liu & Sharma, 2011). However, the stronger party may use the strategy to encourage more support and dependence from the weaker party.

Fourth, *an avoiding* or *inactive negotiation strategy* reflects a "better let the situation cool down before we act" strategy (Day et al., 1988). Firms do little to guide the negotiation process (Das & Kumar, 2011), are indifferent to the concerns of either party, and tend to avoid confrontation (Perdue, Day, & Michaels, 1986). Relying on this strategy signifies a firm's unresponsiveness to its own and other's interest. Although avoidance seems less aggressive than contending strategy, it can result in resentments and encourage negative attitudes between parties, especially in the Japanese context (Liu & Sharma, 2011).

Note that previous research (Thomas, 1976) has identified another type of negotiation, the *compromising* or *sharing strategy*, in which firms interact by engaging in equal or reciprocal concessions based on their initial positions (Ganesan, 1993). However, this strategy provides only moderate satisfaction for the parties involved (Das & Kumar, 2011) (as depicted in Figure 2.3). In addition, Liu and Sharma (2011) summarize that research in the areas of managerial, inter-organizational, and interpersonal conflict management has modified the dual concern model by including measures of assertiveness versus cooperativeness, benefit to self versus benefit to others, manager's priority versus other party's priority, and substantive gain versus relationship outcome (Kilmann & Thomas, 1975).

As previously mentioned, many empirical studies have found that negotiation has an impact on exchange performance (e.g., Ganesa, 1993; Graham, 1986). This research study agrees with these findings. However, it argues that relationship performance can be explained not only by negotiations, but also by governance mechanisms. Negotiations refer to processes, while governance mechanisms refer to structure. However, only a few empirical studies have investigated the relationship between these two concepts. This study takes the position that negotiation and governance mechanism interplay and affect performance of inter-firm relationships. A more detailed description and hypothesis are presented in Chapter 3.

2.4. Summary of theoretical background

This chapter provides a theoretical background on governance structure, inter-firm power and negotiation strategies. Governance is a structure of organizing transactions, involving initiation, ongoing relationship maintenance, and termination. Two main perspectives on governance, TCE and RCT, make different assumptions about the nature of governance and propose choices of governance mechanism. Williamson and Ghani (2012) conclude that TCE provides a constructive framework for analyzing contractual exchange by examining economic organization through the lens of governance and using the transaction as the unit of analysis. The key attributes of human actors are bounded rationality and opportunism. Of the transactional dimensions, the key attribute is specific investments that lead to dependency. Adaptation is the main problem of economic organization. There are two types of adaptations: autonomous and coordinated. Alternative modes of governance are markets and hierarchies. If specific investments are low, autonomous adaptation to change in the simple market exchange will be efficient. However, as specific investments increase and mutual dependence develops, hierarchical governance can reduce the hazards from consequential disturbances. As transactions are aligned with governance structures, the transaction cost that economizes outcomes prevails. There has been significant variation in support for TCE's predictions (David & Han, 2004). Some research studies provides empirical support for its tenets (e.g., Buvik & Andersen, 2002; Heide & John, 1990; Walker & Weber, 1987), while others do not (Klein, Frazier, & Roth, 1990; Russo, 1992). Given this mixed support for TCE, some empirical studies have focused on the scope conditions or moderating variables that affect its tenets (Shervani et al., 2007).

RCT suggests a typology of discrete and relational exchange. Individual transactions in discrete exchange are independent of past and future relationship of exchange partners, while relational exchange accounts explicitly for historical and social context. Relational exchange operates as a self-enforcing safeguard by using many informal and diverse components. Involved firms jointly develop policies with the aim of reaching certain goals. Recent research on transaction costs incorporates relational governance into TCE, either as a replacement of hierarchical form or as a complement (e.g., Artz & Brush, 2000). However, some firms may employ the multiple and distinct types of governance for the same function (i.e., plural forms).

With regard to inter-firm power, it is the case that power is relevant only when at least two parties are involved. Many extant research studies prove that power is the ability of one

exchange partner to affect the decisions of another exchange partner. The power of partner *A* over a partner *B* is a result of *B*'s dependence on *A*, reflecting (a) how essential the resources obtained from *A* are to *B* in achieving its goals and (b) the difficulty *B* perceives in switching to alternative sources of supply. The more attractive the resources that *A* controls, the more that *B* will view its relationship with *A* is essential. Firms use power to control their partners' behaviour. Firms with relatively high power are expected to exploit their partners.

With regard to negotiation strategy, firms use negotiations in their inter-organizational relationships to interact and find an agreement regarding the exchange conditions. Pruitt (1983) suggests that firms use five negotiation strategies—problem solving, contending, accommodative, avoiding, and compromising—depending on their level of concern with their own outcomes (assertiveness) and those of their partners (cooperativeness). Two dominant styles used in research are problem-solving and aggressive negotiation strategies. Many previous studies show the empirical finding that problem-solving negotiation strategy has a positive influence on partner firms' profits and satisfaction (e.g., Graham, 1986), while aggressive negotiation strategy weakens the relationship (e.g., Liu & Sharma, 2011).

2.5. Review of empirical studies

There are several excellent overviews of TCE and RCT (e.g., Dahlstrom & Nygaard, 2010; David & Han, 2004; Gatignon & Gatignon, 2010; Geyskens, Steenkamp, & Kumar, 2006; Gibbons, 2010; Iven, 2002; John & Reve, 2010; Rindfleisch & Heide, 1997, Seggie, 2012); of inter-firm power (Belaya, Gagalyuk, & Hanf, 2009; Hillman, Withers, & Collins, 2009), and of negotiation (e.g., Herbst, Voeth, & Meister, 2011; Rubin & Brown, 1985; Zachariassen, 2008). Therefore, this chapter does not review those overviews individually, but rather highlights the literature related to the research questions, and the theoretical positioning of this dissertation. Section 2.5.1 presents the findings from empirical research that investigates the relationships among TCE, RCT, and inter-firm power theory, while Section 2.5.2 presents the research findings related to the relationships between governance structure and negotiation strategies. The review is drawn from the inter-organizational literature. Section 2.5.3 summarizes the review.

2.5.1. Empirical studies of TCE, RCT and power structure

This section provides an overview of empirical findings related to the relationship among TCE, RCT, and asymmetric-power relationships. David and Han (2004) suggest that TCE receives

mixed support for their prediction, and call for more empirical research on scope conditions. This study responds to that call. It takes the position that power structure moderates the effect of specific investments on governance modes. There are previous empirical studies that have investigated this issue. Heide and John (1988) show that weaker firms in asymmetric-power relationships do not have the ability to establish more integrated mode of governance. These weaker firms could not use integrated governance to protect their specific investments due to low level of power. Instead of making a contract with the manufacturers, they attempted to bond themselves more closely to their customers. Heide and John (1988) refer to this effort as offsetting investments. This study is in line with their reasoning, and intends to improve their methodology by measuring the type of power more systematically and adding the condition of symmetric power to the study.

Bucklin and Sengupta (1993) extend the empirical knowledge of TCE. They study the co-marketing alliance between firms in the computer and semiconductor industries. Co-marketing alliances are a lateral relationship created for the joint management of complementary products and controlled by separated partner firms. Among their findings, they determine that high specific investments and transaction frequency lead to high perception of power asymmetry. However, the interaction of formality, exit barriers, and exclusivity may help reduce damaging perceptions of imbalance among partners. This implies that contractual governance (i.e., formalization) in co-marketing relationships may be effective in reducing asymmetric power when specific investments are high. This dissertation takes the view that Bucklin and Sengupta (1993) confirm the argument of Williamson (1991a, 1999), i.e., that transactors are far-sighted and design governance structure with consideration of dependence ex ante. Their findings support the common prediction of TCE, and oppose the position of this study, which is that the TCE prediction is subject to scope conditions.

Kumar, Scheer, and Steenkamp (1995) empirically study the relationship between asymmetric power and trust, commitment, and conflict, using the survey data from automobile dealers. They find that as asymmetric power increases, the dealer's trust in and commitment to the supplier decreases, and conflict increases. Relationships with greater mutual dependence exhibit higher trust, stronger commitment, and lower conflict than relationships with lower mutual dependence. This dissertation agrees with the findings of Kumar et al. (1995). However, it aims to extend TCE by using specific investments as the determinant, power structure as the moderating variable, and relational governance (analogous to trust) as the dependent variable. In addition, this dissertation also includes the condition of no-interdependent relationship

which is neither asymmetric nor mutual dependent relationships, expanding the scope conditions of TCE.

Geyskens, Steenkamp, Scheer, and Kumar (1996) empirically investigate the joint impact of dealer's perceptions of the channel interdependence structure and its trust in the supplier on both "affective" and "calculative" commitment, using survey data from automobile industries in both United States and the Netherlands. They define affective commitment as the extent to which firms *like* to maintain relationship with specific partners, and calculative commitment as the degree to which firms experience the *need* to maintain a relationship. The findings show that high inter-dependence (i.e., mutual dependence) increases the calculative commitment of both parties, and that asymmetric relationships are associated with more calculative commitment by weaker partners and less calculative commitment by stronger parties. This dissertation takes the view that the findings of Geysken et al. (1996) are consistent with many empirical studies that incorporate relational governance into TCE by replacing hierarchical governance with commitment. As firms make specific investments, they need to commit to the relationship to ensure the return on those investments. In addition, Geyskens et al. (1996) find that asymmetry has a small positive effect on affective commitment. Asymmetry and trust have a positive interactive effect on affective commitment. This dissertation supports the suggestion that trust strengthens the effect of asymmetric power on affective commitment. Furthermore, these findings are consistent with the findings (previously cited) of Kumar et al. (1995). Similarly, this dissertation agrees with the findings of Geykens et al. (1996), and aims to extend that work by using the TCE framework, with the moderations of power structure, and including relational norms as dependent variables.

Lusch and Brown (1996) conduct a thorough empirical investigation of the relationship between power architecture in the wholesaler-supplier relationship and governance modes, using data from small merchant wholesalers and agents or brokers in the United States who carry either durable or non-durable goods. The researchers find the structure of dependency has an impact on modes of governance. First, high mutual dependence between the wholesaler and its supplier leads to more reliance on normative contracts (analogous to relational governance), which leads to improved wholesaler performance. Second, in the relationship in which the wholesaler is a weaker party and its supplier is a stronger party, the wholesaler develops a long-term orientation, which leads to both explicit (analogous to hierarchical governance) and normative contracts. However, only normative contracts lead to a high performance level for the wholesaler. Third, in the relationship in which the supplier depends

on the wholesaler, a more explicit contract is present and the wholesaler has a higher performance level. This dissertation agrees with all findings. However, the Lusch and Brown (1996) study is limited, in that it overlooks the no-interdependent relationship. This dissertation seeks to include all types of power structures as determinants of governance mechanisms; it also considers specific investments.

Buvik and Reve (2001) empirically investigate how the composite of specific investments affects governance structure in industrial purchasing relationships, using data from 161 relationships. In their study, they assume that dependence arises from specific investments. Their finding relevant to this dissertation is that mutual-high specific investments (i.e., mutual dependence) are more positively related to contractual safeguarding than mutual-low specific investments (no-interdependence). They explain further that this finding is contradictory to the original hostage model in which mutual-high specific investments reduce the problem of moral hazards (Williamson, 1983). This dissertation takes the view that the findings of Buvik and Reve (2001) support the common tenet of TCE, which is opposite to the position of this dissertation. This view of this dissertation is that the study of Buvik and Reve (2001) is limited in that it does not consider asymmetric-power relationships.

Buvik and Reve (2002) extend the theory of TCE by combining it with resource-dependence theory. They empirically examine whether the buyer's power influences the alignment of governance mode and specific investments of buyer and supplier, using survey data from 160 industrial purchasing relationships. They find that the buyer's power moderates the positive association between supplier-held specific investments and formalized purchase contracting. On one hand, the dependence of the supplier on its buyer reduces the supplier's ability to safeguard its specific investments with formalized purchase contracting. On the other hand, as the buyer's power increases, buyer-held specific investments are strongly associated with formalized purchase contract. This dissertation agrees with the findings of Buvik and Reve. However, their study is limited in that it does not consider symmetric-power relationships in which partner firms may have mutual-dependent or no-interdependent relationships.

Berthon, Pitt, Ewing, and Bakkeland (2003) extend understanding of the role of relational norms in the context of the relationship between buyers and their sole supplier, implying that buyers are dependent on their only supplier. Data are drawn from the buyer side as well as the supplier side of the dyad. The empirical finding is that norms do not play a significant role in the research context. This dissertation agrees with the findings that, in asymmetric-power

relationships, it is hard to establish relational norms, because stronger firms are likely to retain their power to obtain benefits of the use of power. The Berthon et al. (2003) study is limited in that it does not use the TCE framework, and does not consider all types of power structures.

Shervani et al. (2007) question whether the TCE framework is equally appropriate for all types of firms in all business settings; they conduct an empirical investigation of the manufacturer-distributor relationship in the context of the electronic and telecommunications industry, in which manufacturers are firms with high market power. Analysis suggests that firms with high market power may be able to lower transaction costs even though they make high specific investments under high uncertainty in non-integrated distribution channels because they are likely to have significant monitoring and surveillance capabilities, as well as the ability to exercise legitimate authority and offer various incentives. In contrast, firms with low power do not have such capabilities. Such firms, therefore, need to conduct highly integrated forward channels. This dissertation agrees with the line of reasoning and findings of Shervani et al. (2007). However, the Shervani et al (2007) study is limited in that the symmetric-power relationship is not included.

2.5.2. Empirical studies on governance structure and negotiation strategies

The following section presents empirical studies that examine the relationships between governance structure and negotiation strategies. Of the few studies that focus on this topic, most deal with the influence between the two concepts, which is an approach that differs from the research questions of this dissertation.

Schurr and Ozanne (1985) empirically examine the buyer-seller communication and concession-making processes as influenced by a buyer's prior belief about a seller's trustworthiness and bargaining toughness, using the experimental method with 103 MBA students. Their findings show that if a buyer believes that a seller will use a tough bargaining stance (analogous to aggressive negotiation strategy) and at the same time believes that the seller is untrustworthy, the buyer-seller interaction is least favorable to the seller in terms of total concessions and level of agreement reached. This dissertation agrees with the findings. However, Schurr and Ozanne's (1985) study is limited in that TCE governance was not included in the research model. In addition, their data are drawn from students instead of firm managers (although the researchers claim that students have the characteristics of effective negotiators).

Ness and Haugland (2005) apply case study to investigate the development of governance mechanisms and negotiation strategies in inter-firm relationships with a fixed endpoint. Their findings suggest that trust evolves and changes the relationship structure and interaction process. Even though it is known when the relationship will end, trust and cooperative behaviour can emerge. The study is limited in that the purpose of the researchers is to study the co-evolution of negotiation strategies and governance modes, an approach that differs from the purpose of this dissertation (i.e., interaction effects of the two factors on performance).

Lumineau and Henderson (2009) empirically investigate the impact of governance structure in a buyer-supplier relationship on negotiation strategies, using data from legal files concerning 102 disputes in a number of industries. They find that relational governance leads to collaborative negotiation strategy, but that contractual dimension of control reduces the positive association between relational governance and collaborative negotiation strategy. The study is limited in that it investigates the determination of the concepts, which is an approach that differs from the purpose of this dissertation.

Ness (2009) investigates the combination and recombination of governance mechanisms and negotiation strategies to understand the evolution of relational practice, through a study of three longitudinal cases. He finds that governance mechanisms and negotiation strategies co-evolve. The frequently observed combinations are (a) 'trust' and problem-solving negotiation strategy, (b) 'price' and contending strategy, and (c) 'price' and problem-solving strategy. Furthermore, he suggests that governance mechanisms also change as the result of the use of negotiation strategies. Finally, he suggests that the combination of process and on-going structure might provide a better explanation of alliance outcomes. In the view of this dissertation, The Ness (2009) study focuses on the co-evolution and influence between the two concepts, which is an approach that differs from the purpose of this dissertation.

2.5.3. Summary of review of empirical studies

Several empirical studies focus on the relationships among TCE, RCT and inter-firm power. With regard to integration of TCE and power, Buvik and Reve (2002) find that the buyer's power over the supplier reduces the association relationship between supplier-held specific investments and formalized purchasing contract. The supplier (weaker firm) does not have the ability to establish a more integrated mode of governance. However, this finding is contradictory to the finding of Shervani et al (2007) that weaker-held specific investments are positively related to a highly integrated forward channel, but stronger-held ones are not.

Although the findings of both studies are inconsistent regarding the mode of governance of firms under asymmetric power, they show that asymmetric power has some moderating effects on TCE. This dissertation, therefore, seeks to investigate this issue.

With regard to the integration of RTC and power, Kumar, Scheer, and Steenkamp (1995) find that asymmetric power reduces trust, while mutual dependence increases trust. Similarly, Lusch and Brown (1996) find that mutual dependence leads to more use of normative contracts (analogous to relational governance), while the asymmetric-power relationship leads to the use of explicit contract (analogous to hierarchical governance) and normative contracts. In addition, Berthon, Pitt, Ewing, and Bakkeland (2003) find that norms do not play a significant role in relationships in which buyers depend on their sole supplier. This dissertation notes that without the consideration of specific investments, all findings suggest that asymmetric power reduces trust but increases hierarchical governance, while mutual dependence increases trust. Although previous studies show consistency, they have not investigated the moderating effect of power structure on the relationship between specific investments and relational governance. This dissertation, therefore, seeks to close that gap.

With regard to the relationships between governance structure and negotiation strategies, the conclusion (based on the previous review), is that only some empirical studies focus on this topic. Most investigate the relationship between relational governance and negotiation strategies. Findings show that a high degree of relational governance leads to the use of problem-solving negotiation strategy. There have not been any studies of the interaction effect of negotiation strategies and governance modes on performance. This dissertation, therefore, seeks to close that gap.

3. Research model and hypotheses

3.1. Introduction

To maximise its profit, a firm may lower its costs or increase its sales, by making specific investments to fit the specific requirements of its partner firm. According to TCE, such specific investments create a safeguarding problem because an investing firm cannot exit the relationship without cost. As a result, an investing firm exposes itself to the opportunistic behaviour of its partner firm. This leads to the need for contractual safeguarding to prevent such assumedly inherent opportunism. TCE suggests that hierarchical governance can be a solution (Williamson, 1985). However, although the investing firm is motivated to employ a more integrated governance structure to safeguard its specific investments, this firm may not have the ability to convince its partner firm to establish governance structure in the desired manner (Heide & John, 1992). It seems, therefore, that the conventional TCE framework may not be able to explain all types of firms. The meta-analysis of David and Han (2004) shows mixed support for TCE and calls for more research on "scope conditions" (p. 54), to explain the conditions under which TCE works well. This dissertation addresses the issue of scope conditions concerning the impact of power structure on TCE; it aims to show that in relationships with various types of power structures, firms may choose modes of governance that are different from the prediction of TCE. Therefore, the TCE framework may need to be augmented by consideration of power structure to increase its ability to explain all types of firms.

It is also of interest to investigate the synergy of governance structure and negotiation strategies. Previous research has called for more efforts to merge governance structures and negotiation strategies (e.g., Anderson, 1995; Gulati, 1998; Ring & Van de Ven, 1994). So far, however, only four empirical studies have attempted to integrate the two theoretical perspectives: Lumineau and Henderson (2009), Ness and Haugland (2005), Ness (2009), and Schurr and Ozanne (1985). These studies are limited in that they focus on the influence between the two concepts, while this research aims to show that the use of the two theoretical perspectives together may enhance understanding of the relationships and trade-offs among the factors that affect relationship performance. The use of specific types of negotiation strategies for certain modes of governance goals may lead firms to achieve specific goals.

The research model is therefore based on an integration of TCE, RCT, inter-organizational power, and negotiation strategies. Figure 3.1 illustrates a model of testable hypotheses

developed regarding the extent to which (a) the power structure moderates the effect of specific investments on modes of governance, (b) the interaction or alignment between specific investments and modes of governance affects relationship performance, and (c) the interaction between modes of governance and negotiation strategies affects relationship performance. This is the traditional way to present the model; it is also possible (from a broader point of view) that relationship performance influences specific investments, power structure, negotiation strategies, and even the mode of governance. Research on these more complex relationships is beyond the scope of this study. Rather, this study regards relationship performance as an outcome variable. Furthermore, it is possible for firms to adopt more than one negotiation strategy simultaneously (Euwema, Vliert, & Bakker, 2003). For example, they may adopt different strategies at different stages of their inter-organizational relationships. This results in a more complex study. However, it is established that different strategies are associated with different substantive and relational outcomes (Das & Kumar, 2011).

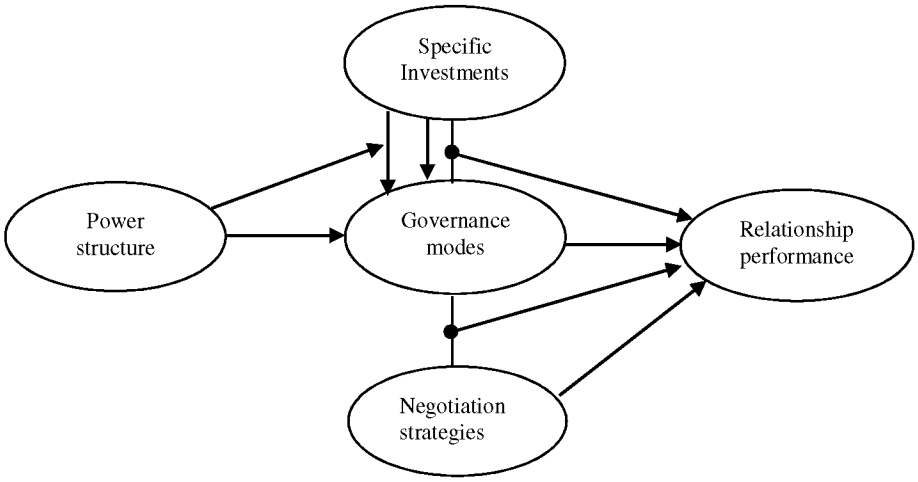

Figure 3.1 The preliminary conceptual model

According to the TCE framework (Williamson, 1985), transactions constituting the economic exchange between buyers and suppliers are considered the units of analysis. The three principal attributes of transaction are specific investments, uncertainty, and transaction frequency. The combination of these three transaction dimensions determines the most cost-efficient mode of governance.

This research focuses only on specific investments, which reflect the degree to which firm assets are tailored to a particular transaction. Williamson (1985) argues that asset specificity is

a critical determinant of firms' choice between market and hierarchical governance and "the big locomotive to which transaction cost economics owes much of its predictive content" (p. 36). As a result, previous TCE studies have most frequently used asset specificity as an independent variable (David & Han, 2004).

The power structure between exchange partners also plays a modest role in the TCE framework (Williamson, 1991a) because TCE assumes that exchange partners are farsighted, and therefore anticipate potential power issues from the beginning. Exchange partners also tend to address the dependency issue *ex ante* while designing a suitable mode of governance. However, it is not always the case that firms can organize their governance mode in the most preferred way. For example, a firm may lack the ability to persuade its exchange partner to agree to its desired contracting mode. Such ability to influence the terms and conditions of contracts is based largely on its power (Argyris & Liebeskind, 1999; Stinchcombe, 1985). Therefore, both a firm's motivation and its ability or power needs to be considered (Heide & John, 1992). This research supports this reasoning and accordingly examines the moderating effect of power structure on the relationship between specific investments and firm's choice of governance modes.

Although many governance modes exist, this study focuses on two main perspectives, TCE and RCT. The original non-market TCE mode of governance is hierarchy. However, many researchers have argued that relational exchange can be used as a viable alternative to hierarchy. Many studies have shown that norms have a safeguarding capacity, a condition that is positively related to the degree of specific investments (Anderson & Weitz, 1992; Bello & Gilliland, 1997; Gundlach, Achrol, & Mentzer, 1995; Heide & John, 1990, 1992; Lusch & Brown, 1996). Thus, previous research (Powell, 1990) has argued that relational contracts should be viewed as governance mechanisms in their own right because they have the capacity to function in both an ex ante role in dictating socially accepted behaviours and an ex post role in evaluating whether and to what extent exchange partners' behaviours conform to established standards.

With regard to dual negotiation strategies, Pruitt's (1983) dual concern model has received strong empirical support. It suggests four alternative strategies, including problem solving, contending, yielding, and inaction. However, problem solving and contending are two general strategies that have appeared in buyer-supplier relationships (Perdue & Summers, 1991). Therefore, the current study considers only these two strategies. A problem-solving negotiation

strategy involves coordinating and searching resolution to ensure that both parties gain. In contrast, firms using contending or aggressive negotiation strategies strive only for individual gain.

Previous researchers have called for efforts to merge governance structures and negotiation strategies (e.g., Anderson, 1995; Gulati, 1998; Ring & Van de Ven, 1994). So far, however, only three empirical studies have attempted to integrate the two theoretical perspectives: Lumineau and Henderson (2009), Ness and Haugland (2005), and Schurr and Ozanne (1985). Use of the two theoretical perspectives together may enhance understanding of the relationships and trade-offs among the factors that affect relationship performance. Therefore, a secondary goal of this study is to investigate the interaction effect between governance modes and negotiation strategies on relationship performance.

The remainder of Chapter 3 is organized as follows: Section 3.2 focuses on the hypotheses concerning the replication of TCE tenets and the integration on TCE and negotiation strategies. Section 3.3 focuses on the effect of power structure on TCE. Section 3.4 focuses on comparing the effect of symmetric and asymmetric-power relationships on TCE. Section 3.5 presents hypotheses regarding the comparison of the effect of mutual-dependent and no-interdependent relationships on TCE.

3.2. TCE prediction and expansion hypotheses

Hypotheses development for this study begins with testing the common tenet of the TCE framework. Next, the TCE framework is expanded by integrating governance modes with negotiation strategies. This group of hypotheses does not consider power structure. Therefore, power structure is not included in the Section 3.2 model (see Figure 3.2), but is included in the model of Sections 3.3, 3.4, and 3.5.

The purpose of this section is to present a testable model of governance modes, negotiation strategies, and relationship performance. Section 3.2.1 replicates the common tenet of the TCE framework concerning the determinants of governance modes. Section 3.2.2 proposes hypotheses concerning the antecedents to relationship performance, including governance modes, negotiation strategies, and various alignments of specific investments, governance modes, and negotiation strategies.

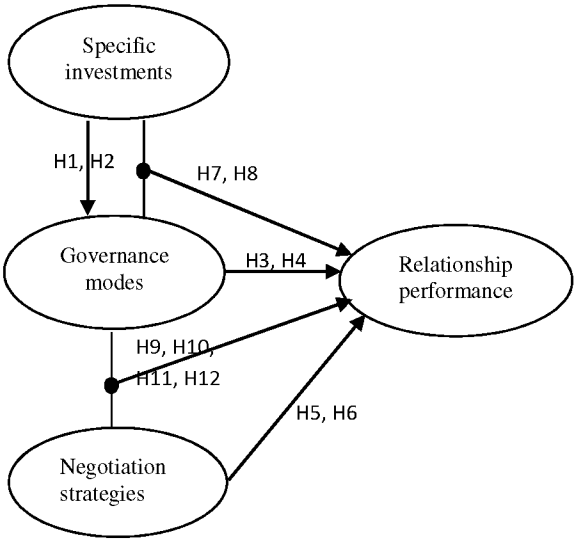

Figure 3.2 A hypothesized model of the common tenet of TCE and the integration between governance modes and negotiation strategies

3.2.1. Antecedents to modes of governance

3.2.1.1. Specific investments

TCE makes the a priori assumption that market governance is more efficient than hierarchical governance due to the benefits of market competition. Integrated transactions under hierarchical governance are protected from competitive pressures, while market transactions are less subject to bureaucratic costs. However, to acquire cost savings or value creation, a firm must tailor its investments to fit the specific requirements of its particular exchange partner. Such specific investments may create some problems because a firm cannot exit the relationship without cost (i.e., lock-in effect), and thus the identity of the parties is crucial. As a result, the firm exposes itself to opportunistic behaviours of its exchange partners, such as failure to perform according to an agreement.

Once a firm makes specific investments, the transaction costs associated with market governance increase, leading to the need for contractual safeguarding to prevent assumed inherent inclinations of its exchange partner to appropriate "quasi rents" (Klein, Crawford, & Alchian, 1978, p. 299). TCE suggests that vertical integration (hybrid or hierarchy) provides a possible solution to such safeguarding problems (Williamson, 1975, 1985); in this case, rules

related to the particular transaction are specified (i.e., formalization), and one party can impose decisions on the other party (i.e., centralization).

The first baseline hypothesis tests whether the common tenet of TCE framework is supported empirically, i.e. whether the mode of governance is likely to be hierarchical when there is a high degree of specific investments.

Hypothesis 1: *The degree of specific investments is positively related to hierarchical governance.*

Geysken et al (2006, p. 522) summarize that the TCE framework originally focused on the dichotomy between market and hierarchical governance. However, researchers have raised the criticism that TCE overstates the desirability of exchange partners on the two mechanisms (i.e., integration and explicit contracts). Many firms conduct collaborative exchanges that are neither market nor hierarchy (Dyer, 1997). Moreover, the meta-analysis of Geyskens et al. (2006) shows that many studies support the notion that as asset specificity increases, relational governance becomes preferred over market governance. In general, the logic is the same as the original idea of TCE, i.e., when specific investments are high, firms are exposed to opportunistic behaviour of exchange partners and thus need to safeguard their specific investments.

Relational contracts have traditionally complemented other contracts in the form of norms and informal agreements (Heide & John, 1992). However, relational contracts can be considered governance mechanisms in "their own right" (Powell, 1990). Two main reasons support this statement. First, relational contracts have the capability to dictate ex ante socially accepted behaviours that maintain the relationship as a whole and promote the goals of the exchange partners (Heide & John, 1992). Second, relational contracts can serve as ex post reference points in the case of non-compliant behaviours, i.e., to evaluate whether and to what degree a partner firm's behaviour conforms to established standards (Ivens, 2002).

Many empirical studies find that the commitment between exchange partners increases following investments (e.g., Anderson & Weitz, 1992; Genesan, 1994), which suggests that a high degree of specific investments influences the creation of relational sentiments. Expectations of payoffs from the future cooperative behaviours prompt the present cooperation (Axelrod, 1984). Socialization processes identify socially accepted behaviours and make clear that deviant behaviours will be punished. As a result, norms are developed and strengthened by trustworthy interactions between exchange partners that generate a win-win exchange situation

(Dwyer et al., 1987; Macneil, 1980; Uzzi, 1997). Eventually, norms obtain sufficient safeguarding capability, thus mitigating exchange hazards. The second baseline hypothesis tests whether the alternative mode of governance is supported empirically.

Hypothesis 2: *The degree of specific investments is positively related to relational governance.*

3.2.2. Antecedents to relationship performance

3.2.2.1. Hierarchical governance

It is hypothesized that hierarchical structure influences relationship performance. This mode of governance controls and coordinates the inter-firm relationship by providing flexibility, and adaptability to disturbance, through clearly articulated clauses (i.e., rules and instructions) that specify penalties. This specification limits opportunistic behaviour and promotes cooperative behaviour (David & Han, 2004; Geyskens, Steenkamp, & Kumar, 2006; Poppo & Zenger, 2002), which leads the partners to the goal of joint profit maximization (Geyskens et al., 2006).

Many previous empirical studies have found a positive association between hierarchical governance (vertical integration and formal governance modes) and relationship performance (e.g., Cannon, Achrol, & Gundlach, 2000; Dahlstrom & Nygaard, 1999; Ghosh & John, 2005; Poppo & Zenger, 2002). Mohr, Fisher, and Nevin (1996) find that as the level of integration increases from independent to company-owned, dealers report higher levels of satisfaction. It is expected, therefore, that when hierarchical governance is used as a form of transaction governance, the transacting parties will obtain greater profit.

Hypothesis 3: *Hierarchical governance is positively related to relationship performance.*

3.2.2.2. Relational governance

Relational governance is expected to influence relationship performance. Rather than relying on an authority structure, parties practicing relational governance jointly develop policies to achieve certain goals (Geyskens, Steenkamp, & Kumar, 2006). By relying on this governance structure, partner firms can reduce transaction costs (Brown, Dev, & Lee, 2000; Buvik & John, 2000; Dyer, 1996; Dyer & Singh, 1998), mitigate opportunistic behaviour (Cannon, Achrol, & Gundlach, 2000; Heide & John, 2002), and facilitate cooperation by using relational norms (Lui, Wong, & Liu 2009; Macneil, 1980). This increases the ability of partner firms to achieve better relationship performance.

Many previous empirical studies support the positive associations between relational governance and relationship performance (e.g., Buvik & John, 2000; Dyer, 1997; Ghosh & John, 1999; Jap & Ganesan, 2000; Lui, Wong, & Liu 2009; Poppo & Zenger, 2002; Rokkan, Heide, & Wathne, 2003). In line with hypothesis 2, exchange partners are likely to obtain higher performance when their mode of governance is relational governance.

Hypothesis 4: *Relational governance is positively related to relationship performance.*

3.2.2.3. Aggressive negotiation strategy

Aggressive negotiation strategy is expected to influence relationship performance. The effect of aggressive negotiation strategy on relationship performance is generally negative. When relying on this negotiation strategy to resolve conflicts, firms implicitly or explicitly use threats, persuasive arguments, or punishments to maximize self-gain at the expense of partner firms. Partner firms perceive this aggressive strategy as exploitive behaviour (Frazier & Summer, 1984) and become more inflexible in their views, which leads to more problems and less conflict resolution (Cadotte & Stern, 1979). The use of an aggressive strategy is more likely to worsen the conflict than solve it (Ganesan, 1993).

Previous research offers convincing theoretical arguments and empirical support for the negative association between an aggressive negotiation strategy and economic and relational outcomes (e.g., Ganesan, 1993; Schurr & Ozanne, 1985).This study seeks to replicate the primary findings regarding outcomes of an aggressive negotiation strategy by testing the following hypothesis:

Hypothesis 5: *An aggressive negotiation strategy is negatively related to relationship performance.*

3.2.2.4. Problem-solving negotiation strategy

In contrast, research consistently suggests and empirically supports a positive relationship between a problem-solving negotiation strategy and performance (e.g., Clopton, 1984; Graham, 1986; Pruitt, 1981). By using problem-solving strategies, firms indicate that they will accommodate their partners' concerns and are willing to work toward problem resolution. This results in profits and a greater satisfaction with the negotiation. This study seeks to replicate the previous findings regarding outcomes of a problem-solving negotiation strategy by testing the following hypothesis.

Hypothesis 6: *A problem-solving negotiation strategy is positively related to relationship performance.*

3.2.2.5. Alignment of specific investments and mode of governance

A contingent alignment framework explains differences in performance across firms based on an alignment of governance structure and conditions the firm encounters (Ghosh & John, 2005; Wathne & Heide, 2004). Firms that align governance structures with their transaction dimensions may economize on transaction costs, which should result in better performance than those who do not (Williamson, 1985).

Many findings from empirical research support the TCE predictions. For example, Brettel, Engelen, & Muller (2011) find that firms that employ direct distribution channels (i.e., hierarchical governance) when specific investments, technological uncertainty, and transaction frequency are high, outperform firms that choose the opposite structure in terms of cost-inclusive performance measures.

Therefore, it can be expected that high levels of specific investments should be associated with the use of hierarchical governance. An efficient alignment between specific investments and governance modes should be associated with lower transaction costs and thus increase the relationship performance (Williamson, 1985).

Hypothesis 7: *The interaction of specific investments and hierarchical governance is positively related to relationship performance.*

Many empirical studies support the finding that relational governance also offers a structure that reduces transaction costs and leads to better relationship performance. For example, Jap (1999) finds that, over time, coordination efforts (analogous to relational governance) and specific investments are positively related to strategic outcomes. Brown, Dev, and Lee (2000) find that relational exchange and a hotel's specific investments have a synergistic effect on reducing hotel opportunism. Similarly, Artz and Brush (2000) empirically validate that relational norms mitigate the impact of manufacturer's specific investments on ex post costs of renegotiation and adjustment of contract between manufacturers and their suppliers. Lui, Wong, and Liu (2009) find that specific investments are related to relationship performance through cooperative behaviour. The following hypothesis is therefore developed:

Hypothesis 8: *The interaction of specific investments and relational governance is positively related to relationship performance.*

3.2.2.6. Interaction of mode of governance and negotiation strategy

In this section, four hypotheses are developed with regard to the interaction effect between governance mode and negotiation strategy on relationship performance. The first hypothesis is developed on the assumption that transaction parties adopt hierarchical governance to manage their relationships and use aggressive negotiation strategies when interacting. Hierarchical governance is supported by an authority structure in which one party is able to develop rules and impose decisions on the other party. This structure allows the implementation of an aggressive negotiation strategy, i.e., "Let's do it my way" (Day, Michaels, & Perdue, 1988, p. 155). The decision-making party exploits and elicits unilateral concessions from its partner (Bannister, 1969; Pruitt, 1981; Robicheaux & El-Ansary, 1975), such as obtaining better trade terms (Beier & Stern, 1969). Furthermore, the decision-making party is able to persuade its partner to work more closely than usual (i.e. over-coordinate). As such, the decision-making party can possess significant monitoring and surveillance capabilities over its partner (Shervani et al., 2007).

Such over-coordinated governance is not an efficient mode of governance, and may hinder profit maximization. The use of an aggressive strategy in which one party strives for individual gain increases opportunism and decreases the relationship performance.

Hypothesis 9: *The interaction between hierarchical governance and aggressive negotiation strategy is negatively related to relationship performance.*

In contrast, the second hypothesis is developed on the assumption that transaction parties adopt hierarchical governance to manage their relationship and use problem-solving negotiation strategies when interacting. Hierarchical governance relies on fiat to resolve disputes, but parties use problem-solving negotiation strategy to exchange information, discuss their needs, create acceptable rules, and justify command. The focus is on the integration of both parties' needs and striving for the best outcomes. Many previous studies support the finding that problem-solving negotiation strategy leads to high profit and satisfaction (e.g., Ganesan, 1993; Graham, 1986; Pruitt & Lewis, 1975).

The interaction effect between hierarchical governance and problem solving is therefore hypothesized to increase relationship performance. The use of a problem-solving negotiation strategy in hierarchical governance leads to that are more acceptable and justified command,

which in turn increases relationship performance. Accordingly, the second hypothesis is as follows:

Hypothesis 10: *The interaction between hierarchical governance and problem-solving negotiation strategy is positively related to relationship performance.*

Third, a hypothesis is developed based on the assumption that parties use relational governance in their relationships, but employ aggressive negotiation strategies when communicating with their partners. When adopting an aggressive negotiation strategy, parties pursue tactics such as threats, persuasive arguments, and time pressures to win their own concerns, usually at the expense of their partners' concerns. Such tactics emphasize the conflicting goals between partners, thereby hindering the safeguarding effect of relational norms on opportunism (Lusch & Brown, 1982). Moreover, aggressive tactics may provoke psychological resistance, which in turn increases opportunism (Provan & Skinner, 1989). The use of aggressive negotiation strategy is expected to decrease the positive association between relational governance and relationship performance. Accordingly, the hypothesis is as follows:

Hypothesis 11*: The interaction between relational governance and aggressive negotiation strategy is negatively related to relationship performance.*

In contrast, if transacting parties develop relational governance to manage their exchange and choose problem-solving negotiation strategies as their style of interaction, their choice is expected to lead to positive relationship performance. In relational governance, relational norms control the exchange partners' behaviour by describing and assessing the appropriate behaviour (Cannon, Achrol et al., 2000), which hinders opportunistic behaviour. While establishing such norms requires inter-firm communication that assists in resolving disputes and aligning perceptions and expectation (Etgar, 1979; Morgan & Hunt, 1994), an accumulation of trust leads to better communication (Anderson & Narus, 1990).

Many previous studies propose and confirm that relational governance (Janda, Murray, & Burton, 2002; Morgan & Hunt, 1994) and the collaborating or problem-solving strategy (e.g., Ganesan, 1993; Graham, 1986; Pruitt & Lewis, 1975) lead to satisfaction with the interaction between exchange partners

Therefore, the interaction effect between relational governance and a problem-solving negotiation strategy is expected to increase relationship performance. An increase in relational governance reduces opportunism, while an increase in problem-solving strategy simultaneously

increases the satisfaction in coordination. Accordingly, the interaction effect between relational governance and collaborating negotiation strategy is hypothesized as follows:

> Hypothesis 12: *The interaction between relational governance and problem-solving negotiation strategy is positively related to relationship performance.*

3.3. Asymmetric power hypotheses

The purpose of this section is to propose hypotheses intended to expand the ability of the TCE framework. A testable model of the effect of asymmetric power on TCE in buyer-supplier relationships is presented (see Figure 3.3). The asymmetric-power relationship is one type of relationship related to power structure. This section elaborates on the relationship among specific investments, asymmetric power, and mode of governance, a topic that some researchers (e.g., Buvik & Reve, 2002; Lusch & Brown, 1996; Shervani et al., 2007) have also empirically studied. These researchers posit that the power structure has an impact on the mode of governance used.

Under conditions involving a high deployment of specific assets, both partner firms become highly inter-dependent because such specific assets cannot be redeployed to another application or relationship without a significant loss in value. Market safeguards against opportunism are no longer effective. TCE predicts that both firms will try to employ contractual safeguarding to protect assets at risk and to minimize transaction costs.

However, asymmetric power should play a role. In an asymmetric-power relationship, even though a firm has assets at risk, hierarchical governance may not be employed because a stronger firm can get its interests met and extract the best exchange terms by using its power (Beier & Stern, 1969; Bosse & Alvarez, 2010); the stronger firm is able to avoid the high cost of establishing hierarchical governance.

A stronger firm is expected to exploit its weaker partner (Bannister, 1969; Robicheaux & El-Ansary, 1975) and gain more protection for its assets at risk (i.e., safeguarding) and more access to its partner's information (Dwyer & Walker, 1981; Frazier & Rody, 1991; Frazier et al., 1989; Heide & John, 1992; Kale, 1986; Roering, 1977; Wilkinson & Kipnis, 1978). A stronger position may allow the stronger partner to monitor the weaker partner's behaviour or give the stronger partner more authority to modify contractual provisions to safeguard its specific investments (Stinchcombe, 1985). With regard to stronger firms, asymmetric power is hypothesized to reduce the effect of specific investments on hierarchical governance. To protect

themselves from opportunistic behaviours, however, weaker firms need to rely on hierarchical governance as they make specific investments. Shervani et al (2007) empirically find that weaker-held specific investments are positively related to the highly integrated forward channel, but stronger-held ones are not.

With regard to relational governance, it may be less motivating for stronger firms to develop relational governance because the stronger partner is likely to retain its right to use its power to earn unilateral benefits from the relationships at the expenses of its weaker partner (Dwyer & Walker, 1981; Frazier et al., 1989; Frazier & Rody; 1991; Kale, 1986; Roering, 1977; Wilkinson & Kipnis, 1978). Asymmetric power should distract the stronger firm from the potential for joint gains (McAlister et al., 1986) and attract it to individual goals (Dwyer, Schurr, & Oh, 1987). In contrast, a weaker firm should be motivated to develop relational governance, as it can benefit from relational norms that mitigate opportunistic behaviour.

Therefore, it can be expected that TCE better explains firms with lower power than firms with high power. That is, specific investments held by weaker firms are expected to be positively related to hierarchical and relational governance, while specific investments held by stronger firms are expected to be negatively related to hierarchical and relational governance.

Hypothesis 13: *Transaction cost economics explains firms with low power better than firms with high power.*

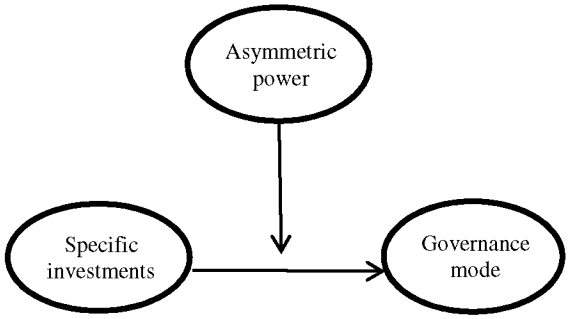

Figure 3.3 A hypothesized model of the impact of asymmetric power on TCE

3.4. Asymmetric and symmetric power hypotheses

The purpose of this section is to propose hypotheses comparing the ability of the TCE framework to explain mode of governance under asymmetric and symmetric-power

relationships. A testable model is presented in Figure 3.4. Two general types of power structure are power symmetry and power asymmetry. With multiple-group analysis, the testable model can be represented as in Figure 3.5.

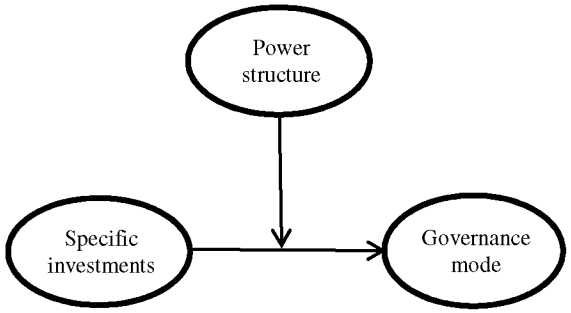

Figure 3.4 A hypothesized model of the impact of power structure TCE

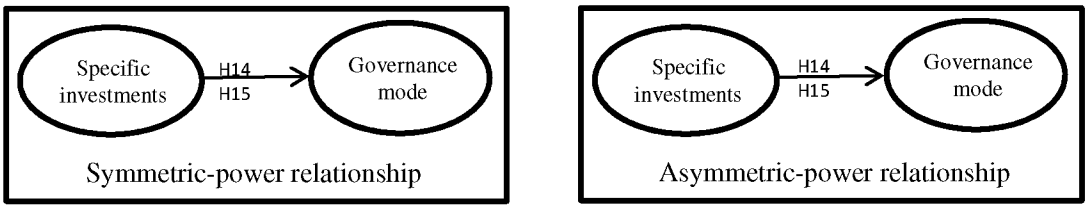

Figure 3.5 A hypothesized model of the impact of asymmetric-power and symmetric-power on TCE

Symmetric-power relationships occur when the power of a firm over its partner is the same as the power its partner has over a firm (Dickson, 1983; Pfeffer, 1981). This relationship is opposite to asymmetric power, in which partner firms have varying degrees of power relative to one other.

Under conditions involving a high deployment of specific assets, TCE predicts that both firms will try to employ contractual safeguarding to protect assets at risk and minimize transaction costs. However, to the degree that both parties view the power as balanced (i.e., both mutual-dependence and no-interdependence), they are likely to resist complying with one-party dominance. Partner firms in symmetric relationships may hesitate to employ hierarchical governance, since hierarchical governance is supported by means of an authority structure, providing one partner with ability to develop rules and impose decisions on the others. In contrast, in asymmetric-power relationships, partner firms are more receptive to power

imbalance. It is more likely that partner firms are less hesitant to develop hierarchical governance to safeguard their assets at risk.

With regard to relational governance, it may be difficult to develop such a governance structure in cases of asymmetric power. According to hypothesis 13, stronger firms may hesitate to employ relational governance because this governance mode can hinder the use of their power. Weaker firms may be motivated to develop this governance, but they do not have the ability to convince their stronger partner firms to agree. In contrast, partner firms in symmetric-power relationships are likely to employ relational governance, as it expresses the sentiment of joint responsibility (Cannon et al., 2000). By relying on relational exchange, both partners can avoid the high costs of establishing and maintaining the bilateral contract (Harrigan, 1983).

Some previous research investigates the relationship among asymmetric power, symmetric power, and relational governance. For example, Lusch and Brown (1996) find that the structure of dependency has an impact on modes of governance. First, high mutual dependence between a wholesaler and its supplier leads to more reliance on normative contracts (analogous to relational governance), which in turn leads to improved wholesaler performance. Second, in a relationship in which the wholesaler is the weaker party and its supplier is the stronger party, the wholesaler develops a long-term orientation that leads to both explicit (analogous to hierarchical governance) and normative contracts. Third, in a relationship in which the supplier depends on the wholesaler, a more explicit contract is present and the wholesaler has a higher performance level.

Therefore, it can be expected that the relationship between specific investments and governance structure is not the same as the relationship between asymmetric and symmetric power groups.

Hypothesis 14: *The degree of specific investments is more positively related to hierarchical governance in an asymmetric-power relationship than in a symmetric-power relationship.*

Hypothesis 15: *The degree of specific investments is more positively related to relational governance in a symmetric-power relationship than in an asymmetric-power relationship.*

3.5. Symmetric power hypotheses

The purpose of this section is to propose hypotheses regarding the effect of the symmetric-power relationship (a type of power structure), on the TCE framework. It expands the previous

hypotheses. Symmetric-power relationships consist of mutual-dependent and no-interdependent relationships. A testable model of the effect of symmetric power on TCE in buyer-supplier relationships is presented (see Figure 3.6). With multiple-group analysis, the testable model can be represented as Figure 3.7.

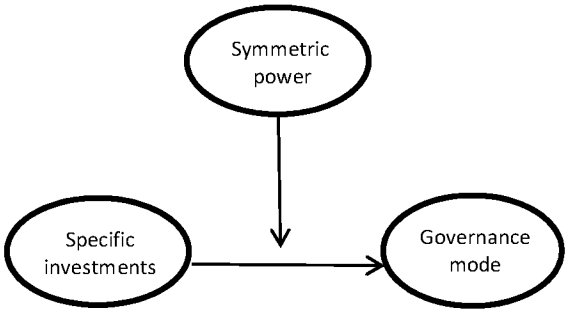

Figure 3.6 A hypothesized model of the impact of power structure TCE

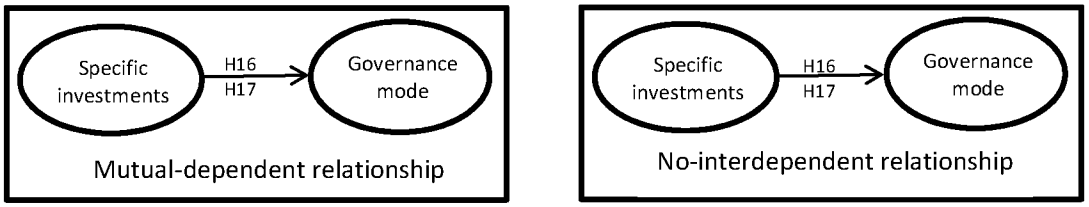

Figure 3.7 A hypothesized model of the impact of symmetric power on TCE

Exchange partners have mutual-dependent relationships when they depend on each other. When both partners are highly mutual-dependent, they are faced with high exit barriers (Geyskens et al., 1996). Mutual trust characterizes this type of relationship. In contrast, partner firms in no-interdependent relationships have more availability of alternative partners. It does not cost much to leave the relationship.

Under conditions in which partner firms have high asset levels at risk due to their deployment of specific investments, TCE predicts that firms will choose a more integrated governance mode to safeguard their investments and reduce transaction costs. However, with regard to the two types of symmetric-power relationships, it may be unnecessary to develop a high cost of hierarchical governance when firms are in mutual-dependent relationships. Relational governance can be used to mitigate opportunism and reduce transaction costs.

In contrast, partner firms in no-interdependence relationships do not have power over each another. As a result, they do not have the ability to control the opportunistic behaviour of their

partners. It may be necessary for firms in no-interdependent relationships to develop hierarchical governance to reduce transaction costs. With regard to relational governance, it is unlikely that firms in no-interdependent relationships will develop relational governance, because trust and commitment are less relevant to the functioning of the relationship (Kumar, Scheer, & Steenkamp, 1995).

Some researchers have studied the relationship between mutual dependence, no-interdependence, and governance structure. For example, Kumar et al. (1995) find that relationships with greater mutual dependence exhibit higher trust, stronger commitment, and lower conflict than relationships with lower mutual dependence.

Therefore, it can be expected that the relationship between specific investments and governance structure in the TCE framework is not the same in groups of non-interdependent relationships and mutual-dependent relationships. The hypotheses are developed as follows:

Hypothesis 16: *The degree of specific investments is more positively related to hierarchical governance in no-interdependent relationships than in mutual-dependent relationships.*

Hypothesis 17: *The degree of specific investments is more positively related to relational governance in mutual-dependent relationships than in no-interdependent relationships.*

3.6. Summary

Chapter 3 details all hypotheses in this study. Hypotheses 1 and 7 test the common tenet of TCE. Hypotheses 2 and 8 test the incorporation of relational governance into the TCE framework. Hypotheses 3 and 4 test the positive relationship between governance structure and relationship performance. Hypotheses 5 and 6 test the effect of two types of negotiation strategies on relationship performance. Hypotheses 9 and 11 test the negative interaction effect of governance structure and aggressive negotiation strategy on relationship performance. Hypotheses 10 and 12 test the positive interaction effect of governance structure and problem-solving negotiation strategy on relationship performance. Hypothesis 13 tests the effect of asymmetric power on the relationship between specific investments and governance structure. Hypotheses 14 and 15 test whether the relationship between specific investments and governance structure is different in asymmetric-power and symmetric-power relationships.

Hypotheses 16 and 17 test whether the relationship between specific investments and governance structure is different in mutual-dependent and no-interdependent relationships.

4. Research design and methods

This chapter presents the research design, validity concerns, empirical setting, sample frame and sample procedures, measurement of the variables, and data collection.

4.1. Research design

As this study is an empirical study designed to conduct theory testing of a causal model, several research designs could be used (Frankfort-Nachmias & Nachmias, 1996). The four broad categories of quantitative research design are classical experiment, quasi-experiment, non-experimental field study, and correlation design. Each type has limitations.

The classical experiment is generally preferred over the rest. This design allows researchers to fully control all variables in the research model and situation, use standardized procedures, manipulate the treatment while controlling the stimuli imposed on the respondents, and compare groups that have received different stimuli. Through experimental research design, the researcher can minimize the possibility of spurious effects on the dependent variable as well as establish that the independent variable precedes the dependent variable in time, allowing the strongest test of the theory (Calder, Phillips, & Tybout, 1981). The design ensures that internal validity is strong and causal relationship can be established. Moreover, by relying on laboratory settings, rather than field research, researchers can conduct multiple operationalizations of variables at lower cost (Calder et al., 1981). However, with regard to the model of this dissertation, the experimental research design is limited by three factors. First, because there are many independent variables in the models, the researcher must establish many experimental groups, which is complicated and costly. Second, external validity tends to be weak because the classical experiment does not allow the researcher to replicate real-life situations in the laboratory. Finally, as the unit of analysis of this study is the relationship between two firms, it is impossible to reproduce complex relationship phenomena for the treatment manipulation in the laboratory. Therefore, the classical experiment is not a suitable research design for this dissertation.

In a *quasi-experiment,* the classical experiment is "brought out" to natural settings, while still maintaining the core characteristics of the classical experiment (Campbell & Stanley, 1963). In this research design, not all variables can be controlled. If the critical variable can be controlled to a non-slight degree, we can assume that ex ante manipulation and ex post comparison are the same as in the classical experiment. Hypothetically, this form of research acquires a high score on internal and construct validities, while making the setting more natural.

However, this form is not suitable for this study because using this design would imply that the degree of specific investments, inter-firm power, and negotiation strategies would be manipulated in a subset of the groups, with the effect on the governance mode studied ex post. This procedure would be difficult to implement in practice because there would be many experimental groups. The time perspective would be an additional obstacle. Therefore, the quasi-experiment is not suitable for this study.

The non-experimental field design or longitudinal design (for example, panel and time series designs) demonstrates direction of influence. Researchers should collect observations from at least two periods to demonstrate statistically that the alleged cause precedes effect. Although this research design could be a suitable option, for this study, the practical limitations of time and the high cost of data collection make it unsuitable.

The primary strengths of the *correlation design* or *cross-sectional design* are internal and construct validities (Cook & Campbell, 1979); this design can also deliver sufficiently high statistical validity, and external validity to a lesser degree. Since this study includes hypotheses that can be tested only when internal and construct validities are high (Mitchell, 1985), cross-sectional design may be a suitable choice. When there are high internal and construct validities, the process of further statistical analysis will also be smooth. A sufficiently high degree of statistical conclusion validity is very important to this study, because it is correlation research requiring a valid statistical conclusion. Cook and Campbell (1979) identify typical threats to statistical conclusion validity that need to be addressed, including low reliability of the measures, low statistical power, violated assumptions, and random irrelevancies in the empirical setting.

As this study uses a casual model, there are three challenges, identified by Bollen (1989), to be faced by researchers using a correlation design: directionality, isolation, and association. First, with regard to *directionality*, it is impossible for correlation design to prove directionality if the study is conducted at one point in time. However, it can be a starting point for further longitudinal studies. Second, the *isolation* challenge requires researchers to find any third variables that threaten valid inference making, since the existence of third variables may degrade the internal validity of the study. Mitchell (1985) suggests that researchers find third variables through systematic thinking and literature reviews; the sample should be homogeneous and a control variable should be included in the model. Third, with regard to *association*, there are two conditions to meet: (a) having variance in the independent construct

to acquire the desired co-variation between the constructs and (b) having a long enough time elapse between cause and effect to ensure that the effect has materialized..

In summary, although experimental research design is generally preferred over other research designs due to its full control of variables and manipulations, it is not suitable for this dissertation due mainly to the impossibility of reproducing the complex inter-firm relationship phenomena. With regard to quasi-experimental research, despite the assumption that ex ante manipulation and ex post comparison are part of the experimental design, the quasi-experimental design is not suitable for this dissertation because there are many independent variables and moderation variables in this study, leading to many experimental groups. Although longitudinal design can help researchers show that cause leads to effect, it takes too much time and is too expensive. The conclusion is that cross-sectional design is the most suitable for this dissertation because it delivers a high degree of the internal and construct validity required to test the hypotheses.

4.2. Validity concerns

Cook and Campbell (1979) suggest four forms of validity that must be considered when conducting research: internal, external, statistical conclusion, and construct. *Internal validity* occurs when two variables co-vary. Changes in the independent variable must influence the changes in the dependent variable, a condition under which the effect of other factors must be ruled out, and directionality must be established. *External validity* refers to the generalizability of the study results, i.e., whether they are applicable to other contexts. *Statistical conclusion validaty* is defined as "inferences about whether it is reasonable to presume co-variation given a specified alpha level and the obtained variances" (Cook & Campbell, 1979, p. 41), i.e., whether co-variation between two variables can be assumed. *Construct validity* is defined as "… the degree to which a measure assesses the construct it is purported to assess" (Peter, 1981, p. 134), or the degree of correspondence between a theoretical construct and an operational measure (Mitchell, 1985). A valid measure assesses the magnitude and direction of the construct, as well as contamination. It is concerned with the confounding problem, i.e., whether the measures of constructs can be otherwise construed.

Construct validity can be further divided into trait validity and nomological validity; both must be addressed when conducting correlation research. Campbell and Fiske (1959) identify the primary concerns of trait validity, including *consistency of measure* (i.e., absence of measurement errors), *convergent validity* (i.e., the measure should not vary with the construct),

and *discriminant validity* (i.e., the measure should not vary with other constructs). Nomological validity is concerned with the examination of the relationship among theoretical constructs, and the empirical relationships between measures of those constructs (Peter, 1981).

Ideally, researchers should select a research design that provides a high degree of validity for all kinds of validity. However, reaching that ideal is impossible due to the nature of empirical research. According to McGrath (1982), "the research process can be viewed as a series of interlocking choices, in which we try simultaneously to maximize several conflicting desiderata" (p. 69). Typically, when a study scores high on one form of validity, it scores low on another. For example, empirical research conducted using a classical experimental design may achieve high internal validity but its external validity is likely to be low (Cook & Campbell, 1979; McGrath, 1982).

4.3. Empirical setting

Calder et al. (1981) identify two types of application in research: (a) *effect application*, which focuses on knowledge about some particular real-world context and (b) *theory application*, which focuses on general and scientific knowledge about the real world. The latter type of application employs falsification procedures to test the particular theory or model in a certain context. Since this study is theory-testing research, it is classified as a theory application.

In theory testing of a causal model, internal and statistical conclusion validities are more important than external validity (Cook & Campbell, 1979) because external validity can be established by conducting several similar studies in different contexts. As a result, the chosen empirical setting must provide a sufficient variation over the main variables in the model, and no variation in other variable, and the sample should be homogenous (Calder et al., 1981). However, it is difficult to find such a setting, because variable variation is usually the result of a heterogenic sample (which comes with the variation over extraneous variables). On one hand, it will be hard to rule out alternative explanations and establish any statistically significant effects of the focal independent variables in the model. On the other hand, if the sample is homogenous, variation over critical variable is usually not provided. Therefore, researchers must balance this tradeoff.

To acquire high scores on internal and statistical conclusion validities, the use of a single industry seems to be appropriate because it ensures that the samples are homogeneous (Cook & Campbell, 1979). It can be presumed that confounding factors associated with a specific industry will be excluded or reduced. External validity is sacrificed to acquire internal validity,

and if the theory is not falsified in that industry, further research in other industries should be conducted to prove the external validity.

Although this study uses a single industry (thereby reducing the external validity), there will be differences between samples due to different segments of the industry; the study will include a broad selection of transactions, oil companies, and their suppliers. Some suppliers are specialist firms, while some supply commodity products. Ideally, one segment would be sufficient to minimize noise. However, all segments will be included to ensure an optimal sample size. Since this study uses only one industry, it will control for (more or less) the need for a homogenous context.

The requirements of the empirical context will be fulfilled when all variables in the research model materialize in the empirical context to different degrees. For the study, an industry must be found that demonstrates, to varying degrees, the following phenomena: (a) specific investments, (b) power-structured relationships, (c) hierarchical governance, (d) relational governance, (e) negotiation strategy, and (f) relationship performance.

The oil and gas industry (O & G industry) appears to fulfil these requirements. As a buyer, an oil firm pays a straight fee for service or buys supplies and equipment from supplier firms or contractors, in a buyer-supplier dyadic relationship. These purchases have evolved from market-based exchanges to more integrated relationships and have involved the sharing of risk and reward (Ernst & Steinhubl, 1997).

With regard to the first requirement of specific investments, partner firms in the O & G industry deploy specific investments. For example, they make specific investments to ensure that working targets are met, while preserving the safety of people involved and minimizing the probability of damage to the environment (Green, 2003). Therefore, the first requirement of specific investments exists and materializes in this industry to varying degrees.

With regard to the second requirement of power structure, particularly asymmetric power, the power asymmetry phenomenon exists in the O & G industry between oil firms and their suppliers, and exhibits in two directions. The first direction is that an oil firm is the firm with relatively high power and its supplying firm is the weaker partner. The degree of asymmetric power is likely to be high because there are small numbers of oil firms serving as operator firms, but a large number of industrial vending firms providing products and services for the construction and maintenance of offshore fields (Reve & Johansen, 1982). These vending firms are direct competitors in the open market (Green, 2003). The small numbers of oil firms

increase the scarcity of rewards that oil firms provide to supplying firms, thus increasing the degree of power asymmetry. The second direction is that a supplying firm possesses power over an oil firm. The O & G industry includes types of suppliers known as specialist firms (usually small firms), that have specialized "know-how" and technology that oil firms (usually large firms) would like to acquire (Ernst & Steinhubl, 1997). Under the harsh and potentially hazardous conditions of the industry, operator firms rely heavily on specialist contractors to support their operations (Green, 2003). Such technological expertise may create technical dependency (Reve & Johansen, 1982).

The third and fourth requirements concern the mode of governance. Extant studies of mode of governance in the O & G industry show that exchanges are governed by various types of structures. For example, Ernst & Steinhubl (1997) identify governance modes that vary from hybrids to hierarchies. Green (2003), Green and Keogh (2000), and Sunde (2007) emphasize the existence, benefits, and development of trust in this industry. Olsen, Haugland, Karlsen, and Husøy (2005) investigate applicability and limits of TCE and RCT.

The fifth requirement involves the negotiation styles used between exchange partners. Negotiation exists between buyers and sellers because communication is possible in a context in which each party is interested in conducting an exchange to achieve their goals. However, each party has competing interests that require the buyer and seller to negotiate to obtain the best possible outcomes for their firms (Clopton, 1984; Dwyer & Walker, 1981). Firms in the same industry manage their conflicts in different ways (Gelfand et al. 2008; Pinkley & Northcraft, 1994; Pruitt, 1983; Putnam & Wilson, 1982; Thomas, 1976). Therefore, firms in the O & G industry constitute the appropriate empirical setting.

Relationship performance is the dependent variable and the final requirement for the research context. Firms in the same industry generally have different degrees of performance. Therefore, the O & G industry is an appropriate empirical setting for this study.

4.4. Sample frame and sample procedures

The literature is not consistent on the issue of sample size. Many factors can determine sample size but the subject can be viewed from two perspectives. The first perspective considers the experience of extant studies. There are many empirical studies on closely related topics, with sample sizes ranging from a hundred to more than a thousand observations.

The second approach is to consider the number of independent variables to be estimated. If a moderating effect will also be considered, the required sample size will increase. The more independent the variable, the larger the sample size required (Bollen, 1989; Hair, Anderson, Tatham et al., 1998). At least 100 informants are needed when conducting theory testing (Bollen, 1989). Low numbers of informants (low n) and low alpha level may increase the possibility of making an incorrect no-different conclusion (Type I-error), thereby rejecting a true model.

Bentler and Chou (1987) suggest a rule-of-thumb with regard to sample size. They indicate a ratio between sample size and the number of free parameters as 5:1. However, relative to the structural equation modeling (SEM) used in this study, Hair et al (1998) suggest four factors to take into account: (a) model misspecification, (b) model size, (c) departure from normality, and (d) estimation procedure. Specification error occurs when relevant variables in the model are omitted. Sample size should be increased when the researcher suspects this error. The ratio of 5:1 is recommended, however, a ratio of 10:1 is considered most appropriate; and if the researcher suspects the data violates the assumptions of multivariate normality, the ratio is increased to 15:1.

The conclusion is that the literature on sample size is highly divergent. Many factors can determine sample size. Sample size for this study can be estimated from previous study in the field or based on consideration of the number of variables to be estimated. A ratio range of 5:1 to 15:1 between observation and variables is advised, depending on whether the researcher suspects specification errors. In this study, the number of free parameters to be estimated is approximately 30. The actual number varies from one model to another. Since the literature does not give an exact ratio, the ratio of 5-15 observations to one variable should be maintained. Therefore, the sample size should be in the range of 150 (i.e., 5 × 30) to 450 (i.e., 15 ×30) observations. As previously mentioned, it is difficult to determine the exact number of population of dyadic relationships between buyers and sellers in the O & G industry. The sample frame is estimated by sample size divided by expected response rate, a figure that can be acquired from the literature in the industry. Sunde (2007) suggests that a response rate of approximately 40% can be expected. Therefore, the sample frame should fall between 375 and 1,125 informants.

The Norwegian O & G industry consists of several hundred companies. The exact number of the population of the exchanges or relationships between buying and supplying companies was

difficult to obtain. Authors of two empirical studies shared their contact lists of supplier companies that sold a large share of their products and services to other companies in O & G industry; Sunde (2007) provided a list of 433 companies and Vatne (2007) provided a list of 515 companies. The lists were combined and updated with Brønnøysundregistrene, producing a final list of 444 companies. An additional 158 relevant companies were identified from an Internet search of the following websites: www.offshore.no, www.oilinfo.no, www.oilport.net, www.intsok.no, www.odin.dep.no, www.og21.no, www.nfp.no, www.olf.no, www.petromagasinet.no, www.petrad.no, www. Navitasnetwork.no, www.nortrade.no, and www.norskindustri.no\olje_og_gsss\, www.subsea.org. In total, the initial study sample included 602 companies.

4.5. Measurement

This section describes the various stages of the measurement process and presents all constructs included in the theoretical model.

4.5.1. The measurement process

With regard to the measurement process, Bollen's (1989) procedure is highly acknowledged and frequently cited. Bollen (1989) suggests that this process begins with the concept, which is an idea that unites phenomena under a single term. The measurement process links the theoretically developed concepts to one or more latent variables, and these latent variables are further linked to observable variables. Four steps are suggested: (a) give the meaning of the concept; (b) identify the dimensions and latent variables to represent it; (c) form measures; and (d) specify the relation between the measures and the latent variables.

The first two steps of this process were completed in Chapter 2. In the first step, all of the theoretical constructs were defined and explained by the extant literature. In the second step, the latent variables and their indicators (representing the constructs) were also explained. Because a theoretical construct may consist of one or more dimensions, there must be one latent variable for each dimension of the construct. In this research study, there are five main constructs in the full theoretical model, as depicted in Figure 3.1. Three constructs have more than one dimension: hierarchical governance, relational governance, and relationship performance. All other constructs have only one dimension.

The third step is to form measures to represent the latent variables in the theoretical model. This dissertation applied well-established theoretical constructs and established measures that

have been validated by previous research. This eased the measures-forming process. Conversely, when identical constructs are operationalized differently across empirical studies, it is difficult to accumulate knowledge (Churchill, 1979).

An intensive literature review in the field of inter-organizational relationships was conducted to identify potentially relevant empirical measures. Multiple measures were taken to ensure that constructs are not underrepresented and the ability to test validity requirements was provided. In inter-organizational literature, theory is well developed. Established and validated measures have been developed. This study uses the same unit of analysis as used in the inter-organizational literature, which is the relationship between buyer and seller. This implies that if the measures need to be re-formed to fit within the empirical setting, only a low degree of adjustment will be required. Therefore, the validity of the measurements should be convincing. However, face validity was established to increase the degree of validity. Face validity is a subjective evaluation of the measure validity by researchers (Frankfort-Nachmias & Nachmias, 1996). Before collecting the data though the e-questionnaire, face validity was established through consultation with both industry and academic experts, including sales managers in supplier firms, purchasing managers in oil firms, and academics engaged in procurement, logistics, and production planning.

All constructs in the model have been operationalized and measured a number of times in the inter-organizational literature. This applies to both first and second sub-models. Therefore, it was straightforward to use their measures in this study.

The fourth step of the measurement process is to specify the relationships between the measures and the latent variables. This was achieved after data was acquired and analyzed. Reflective scales were used instead of formative scales because measures were assumed to share a common factor. As constructs increase its value, the value of items should be reflected and increased. In addition, all constructs were measured by the use of perceptual data.

4.5.2. The measures

Construct, as Peter (1979) states, is defined as too complex to be measured effectively with a single measure. It is necessary to use multiple indicators to achieve construct reliability and validity. Bollen (1989) argues that at least two indicators should be incorporated per latent variable within a confirmatory factor analysis. However, Jaccard and Wan (1996) indicate that research with two indicators has the potential for analytic complications resulting from empirical under-identification. As mentioned previously, theory is well developed in the inter-

organizational literature. Measures in this study have been developed from existing, validated measures, with the exception of the measure of contract design capability (which is one of the control variables).

4.5.2.1. Dependent variables

Mode of governance is the single dependent variable in the first sub-model (see Figure. 3.1). Variables for mode of governance are hierarchical and relational governances. However, these two variables are independent variables in the second sub-model. The only dependent variable of the second sub-model is relationship performance.

Hierarchical governance

Hierarchical governance is defined as the degree to which one exchange partner has the ability to develop rules (e.g. dispute resolution mechanisms), give instructions (i.e., formalization), and, in effect, impose decisions on others, and to the degree to which the exchange partners follow the agreed-on rules and procedures during the execution of the exchange (Geyskens et al., 2006; Haugland & Reve, 2004; Stinchcombe, 1985). This study conceptualizes hierarchical governance as higher-order concept centralization of formalization and centralization. These two elements are useful in reducing uncertainty because they provide insight into the internal structure used to govern the exchange.. A scale is developed based on the inter-organizational literature, and adjusted to the appropriate object of analysis and context. There seems to be agreement in the literature about operationalization of the formalization, though it is inconsistent regarding centralization. Indicators of formalization are developed based on Haugland and Reve (2004) and Sunde (2007). Items reflecting centralization are developed based on Heide and John (1992), using a nine-item, seven-point scale, anchored from "strongly disagree" to "strongly agree". Note that hierarchical governance is also an independent variable for the model in the second phase.

- *Formalization*
    1. Either our company or this customer has developed rules and procedures for most issues in the exchange.
    2. How to handle the day-to-day management of the exchange is written in a formal contract document.
    3. Both our company and this customer intend to follow jointly agreed-on rules and procedures in the daily management of the exchange.
    4. It is important to our company to behave correctly according to the contract.

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

- *Centralization*
  1. The processes in the exchange are entirely decided by one party, either our company or this customer.
  2. On-going changes in the exchange are entirely decided by one party, either our company or this customer.
  3. Subcontractors/contractors are chosen by one party, either our company or this customer.
  4. The quality control procedures in the exchange are entirely decided by one party, either our company or this customer.

Relational governance

Relational governance is a governance mode in which the parties to a transaction jointly develop policies directed toward the achievement of certain goals. It refers to norms of obligation and cooperation for coordinating exchange process (Geysken et al., 2006; Haugland & Reve, 2004). Relational norms are expectations about attitudes and behaviours that are at least partly shared by a group of decision makers (Gibbs, 1981).

According to Cannon et al. (2000), Heide and John (1992), and Poppo and Zenger (2002), there are four norms of particular importance in cooperative relationships: flexibility, solidarity, information exchange, and restraint in the use of power. Note that relational governance is also an independent variable for the model in the second sub-model.

- *Flexibility*

Reliance-on-flexibility parties are willing to make adaptations as circumstances change (Heide & John, 1992). This norm represents a safeguard to both parties if the exchange is plagued with a high degree of uncertainty. Both parties know that the exchange will be subject to good-faith modifications and have an attitude that the agreement could be modified as the relationship evolves and develops.

Based on empirical studies (Antia & Frazier, 2001; Dwyer & Oh, 1988; Heide & John, 1992; Jap & Ganesan, 2000; Lusch & Brown, 1996; Rokkan et al., 2003) the items are adjusted to fit the context (three items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

Both our company and this customer…

1. are flexible in their response to last-minute requests made by the other party.
2. are open to each other's request to modify a prior agreement.
3. would rather work out a new deal than hold each other to the original terms, when some unexpected situation arises.

- *Solidarity*

Reliance-on-solidarity parties have the attitude that success comes from working cooperatively together, not competing against one another. Parties stand by one another in the face of adversity and the "ups and downs" of marketplace competition (Cannon et al., 2000). "Solidarity promotes a bilateral approach to problem solving, creating a commitment to joint action through mutual adjustment" (Poppo & Zenger, 2002, p. 710). A high degree of solidarity represents a safeguard to both parties because it deters both parties from using decision control in an opportunistic way.

Based on empirical studies (Antia & Frazier, 2001; Bello, Chelariu, & Zhang, 2003; Dant & Schul, 1992; Dwyer & Oh, 1988; Heide & John, 1992; Jap & Ganesan, 2000; Lusch & Brown, 1996; Rokkan et al., 2003) the items are adjusted to fit the context (four items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

Important problems that arise in the course of this exchange are treated by my firm and the partner firm as joint, rather than individual responsibilities.

Both our company and this customer…

1. are committed to improvements that may benefit the exchange as a whole and not only the individual parties.
2. do not mind owing each other favours.
3. solve problems as joint rather than individual responsibilities.
4. have a relationship that is better described as a cooperative effort rather than an "arms-length negotiation."

- *Information exchange*

Information exchange, as described by Heide and John (1992), "defines a bilateral expectation that the parties will proactively provide information useful to the partner" (p. 35). A high degree of information exchange functions as a safeguard when decision control is transferred in the project.

There seems to be consistency among researchers on how to operationalize this construct. A measure was developed based on the inter-organizational literature, and adjusted to the research context (Dwyer & Oh, 1988; Heide & John, 1992; Jap & Ganesan, 2000; Lusch & Brown, 1996). The items include (five items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

1. In this exchange, it is expected that any information that might help another party will be provided to them.
2. Information is informally exchanged in this exchange.
3. Both our company and this customer are expected to keep each other informed about events or changes that may affect the project.
4. Exchange of information in this exchange takes place frequently.
5. Both our company and this customer are expected to provide proprietary information if it can help another party or the exchange.

- *Restraint in the use of power*

Restraint in the use of power refers to a bilateral expectation and attitude that power asymmetry and dependency should not be exploited opportunistically. It reflects the view that the use of power exacerbates conflict over time and undermines mutuality and solidarity, leading to opportunism (Cannon et al., 2000).

Based on Cannon et al. (2000) and Kaufmann and Dant (1992), items include (three items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

1. Our company or this customer will not take advantage of a stronger bargaining position.
2. It is expected that even the more powerful party should restrain the use of its power in attempting to get its own way.
3. It is expected that each party should limit the use of power they have over the other party.

Relationship performance

Relationship performance is conceptualized with three dimensions: cost reduction outcomes, end-product enhancement outcomes, and satisfaction with collaboration.

- *Cost reduction outcomes*

Based on the empirical study of Ghosh and John (2005), this study originally defined cost reduction outcomes as joint net gains at the relationship level. However, in this study, this

variable is associated only with the supplier's cost reduction outcomes. Therefore, cost reduction outcomes refer to the supplier's net gains from lower production and administrative costs of a sold item that result from using customized production techniques and processes, cheaper materials, simplified designs, and other cost-saving measures. This dimension of relationship performance enables exploration of what factors contribute to realizing a cost reduction strategy. The following items are based on Sunde (2007) (five items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

Due to this exchange …

1. our company can reduce costs.
2. our company's business processes and procedures become more efficient.
3. coordination of activities with this customer has become more efficient than with other customers.
4. our company has been able to realize cost reductions through implementation of efficient practices.
5. our company is better able to respond to fluctuations in the market.

- *End-product enhancement outcomes*

Based on the empirical study of Ghosh and John (2005), this study identifies end-product enhancement outcomes as the joint net gains from increased customer utility delivered by the end product. However, in this study this variable concerns only the supplier's end-production enhancement outcomes. Therefore, end-product enhancement outcomes refer to the supplier's net gains from increased customer utility delivered by the end product. This dimension of relationship performance enables exploration of which factors contribute to the realization of differentiation strategy. The following items are based on Sunde (2007) (five items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

Due to this exchange …

1. our sales have been boosted.
2. the consumer's perception of our end-products/services has become better.
3. the image of our products/services in the consumer's eyes has been significantly strengthened.
4. our products/services are positively different from our competitors.
5. our company is better able to capture design and engineering synergies between this customer's end products and our products/services.

- *Satisfaction with the collaboration*

Satisfaction with the collaboration refers to a positive affective state created by the evaluation of all aspects of a relationship (Jap, 2001). This variable is one of the frequently used outcome variables (Geyskens, Steenkamp, & Kumar, 1999). The following items are based on empirical study (Jap, 2001) (three items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

The collaboration with this customer…

1. has been a successful one.
2. more than fulfilled my company's expectations.
3. has made our company satisfied with the outcomes.

4.5.2.2. Independent variables

Independent variables in the first sub-model are specific investments and power asymmetry. Independent variables in the second sub-model are governance modes and negotiation strategies.

Specific investments

Specific investments or asset specificity is defined as the degree to which the assets that support a given transaction, or modify processes, product technologies or procedures, are tailored to it and cannot be redeployed easily outside a particular exchange relationship (Cannon et al., 2000; Geyskens et al., 2006). Examples of specific investments are site specificity, physical specificity, human asset specificity, brand name capital, dedicated assets, and temporal specificity (Reve & Levitt, 1984; Williamson, 1985, 1991). Since switching costs arise if a firm is changes partners, these investments create dependency on a specific partner.

There seems to be consistency in the literature regarding the definition and the operationalization of this construct. The following items are based on empirical studies (Buvik & John, 2000; Cannon et al., 2000; Haugland & Reve, 1994; Heide & John, 1990; Heide & Stump, 1995; Joshi & Campbell, 2003; Rokkan et al., 2003) (eight items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

- *Supplying firm's specific investments*

With regard to investments that our company dedicates for this particular exchange, our company…

1. spent significant resources in reorganizing/adjusting our own organization.

2. spent resources on training and developing our employees.
3. has made significant investments in tools and equipment.
4. has carried out considerable product adjustments to meet the requirements from this customer.
5. has made several adjustments to adapt to this customer's technological norms and standards.
6. has acquired competence, which has a limited value for us if the exchange is terminated or our company stops doing business with this customer.
7. has used considerable time and resources to build the relationship with this customer.
8. will have a great loss if this exchange terminates.

- *Buying firm's specific investments*

With regard to investments that this customer dedicates for this particular exchange, in your perception this customer…

1. spent significant resources in reorganizing/adjusting their organization.
2. spent resources on training and developing their employees.
3. has made significant investments in tools and equipment.
4. has carried out considerable product/service adjustments to meet the requirements from us.
5. has made several adjustments to adapt to our technological norms and standards.
6. has acquired competence, which has a limited value for them if the exchange is terminated or they stop doing business with us.
7. has used considerable time and resources to build the relationship with us.
8. will have a great loss if this exchange terminates.

Power structure

Power structure describes what type of relationship a firm has with its partner. It is divided into two types: asymmetry and symmetry. These two types represent opposite ends. A low degree of power asymmetry is a high degree of power symmetry, and vice versa. Both types of power can be measured. Many research studies have operationalized power asymmetry. Therefore, reviewing the measure of asymmetric power is the starting point.

Power asymmetry has been defined as the difference between a firm's power and its partner's power in a dyad (Gundlach & Cadotte, 1994; Kumar et al., 1995). Power is the ability of a firm

to control or influence the decision variables of its partner (Anderson & Narus, 1990; El-Ansary & Stern, 1972; Etgar, 1977; Hunt & Nevin, 1974). In general, the measure of asymmetric power can be constructed in two ways: direct and indict operationalization.

First, direct operationalization distinguishes the respondents in groups between symmetric and asymmetric-power relationships. The measure can reflect power either by (a) the influence of one firm on another (e.g. Brown, Lusch, & Nicholson; 1995) or (b) the dependence between the partners (e.g. Jambulingam, Kathuria, & Nevin; 2011)

Brown, Lusch, and Nicholson (1995) directly classify the respondents into three groups according to decision variable scores. The groups with the highest and lowest scores are said to belong to an asymmetric-power relationship. According to this approach, we can distinguish between symmetric and asymmetric-power relationships, but we cannot identify what type of firm comprises certain relationships. For example, a symmetric-power relationship can result from mutual high power (i.e., both partners have a high degree of power over each other) or mutual low power (i.e., both partners have a low degree of power over each other).

The categorical scale, or dummy variable, developed by Jambulingam, Kathuria, and Nevin (2011), based on Emerson's (1962) power dependence theory, can both distinguish respondents between symmetric and asymmetric relationships and identify the type of symmetric power between mutually-dependent relationships or no-interdependent relationships. Many studies (e.g., El-Ansary & Stern, 1972; Frazier & Summers, 1986; Spekman, 1979) operationalize the measurement of power on the concept of power dependence. That is, the power of *A* over *B* is equal to, and based on, the dependence of *B* on *A*.

Second, the asymmetric power construct can be operationalized by calculating the absolute value of the difference between a firm's power and its partner's power (Bucklin & Sengupta, 1993; Kumar et al., 1995). The amount of power of both firms is measured and the difference of these two values is calculated. The power-composition of the relationship can be identified using this approach.

This study adopts the first approach to acquire richer data and be methodologically compatible with, and adjusted to, the empirical setting of this research. The approach is to measure the power structure directly. The following items are based on Jambulingam et al. (2011) (with the measure using dependence to reflect power [Emerson, 1962]):

- *Power structure*

Please check the one statement below that best describes your relationship with this customer.

1. Our company is more dependent on this customer.
2. This customer is more dependent on our company.
3. Our firm and this customer are equally dependent on each other.
4. Our firm is not dependent on this customer, and this customer is not dependent on our firm.

Aggressive negotiation strategy

Aggressive negotiation strategy refers to the interaction pattern used by exchange partners to develop conflict solutions through the implicit or explicit use of threats, persuasive arguments, and punishments (Ganesan, 1993). The following items are based on Ganesan (1993) (eight items, seven-point scale, anchored by "strongly disagree" to "strongly agree")

When our company and this customer interact with each other, both parties...

1. press to get their points made.
2. make efforts to get their way.
3. are committed to their initial position during the negotiation.
4. try to win their position.
5. threaten to break off negotiations with each other.
6. indicate that we wanted to deal with other alternative partner.
7. make implicit threats to each other.
8. express displeasure with each other's behaviour.

Problem-solving negotiation strategy

Problem-solving negotiation strategy refers to the interaction pattern used by exchange partners to develop conflict solutions that integrate the requirements of both parties (Walton & McKersie, 1965). The following items are based on Ganesan (1993) (six items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

When our company and this customer interact with each other, both parties...

1. lean toward a direct discussion of the problem with each other.
2. try to show each other the logic and benefits of their position.
3. communicate their priorities clearly to each other.
4. attempt to get all their concerns and issues in the open.
5. tell each other their ideas and ask the other for their ideas.

6. share the problem with each other so that they can work it out.

4.5.2.3. Control variables

It is necessary to account for the potentially spurious effects of potential extraneous variables, so these effects can be ruled out statistically. Data on variables that seem correlated with the dependent variables must be collected. Variables from other perspectives that offer competing explanations to varying degrees of governance mode and firm performance must be considered. Once explanations from such perspectives are ruled out statistically, the confidence in the theoretical model will increase (Jøreskog & Sørbom, 1993; Meehl, 1990).

Environmental uncertainty

Although uncertainty is a transaction dimension, it receives ample support in the organizational and institutional economics literature as a key environmental dimension that influences mode of governance (Achrol, Reve, & Stern, 1983).

As specific investments increase to a non-slight degree, the continuity of relationship is relevant. High degrees of environmental uncertainty create problems of adaptation, as partner firms find it hard to specify contractual agreements ex ante. Exchange partners will have to make sequential adaptations (Williamson, 1985). Moreover, change in environment offers opportunities for agents to shirk and to renegotiate to their advantage (Anderson & Gatignon, 1986).

When experiencing environmental change, the firm is likely to increase the degree of control by increasing the complexity of contract to cover all possible contingencies, i.e., the problem of adaptation problem can be addressed through hierarchical governance. However, several researchers (e.g. Afuah, 2001; Balakrishnan & Wernerfelf, 1986; Folta, 1998; Kogut, 1991) argue that high degrees of environmental uncertainty should also encourage firms to maintain flexibility by lowering the degree of specific investments; this position argues against hierarchical governance (Geyskens et al., 2006). As a result, environmental uncertainty must be included as a control variable.

Environmental uncertainty refers to the degree to which the relevant contingencies surrounding an exchange cannot be anticipated and accurately predicted (Geyskens et al., 2006; Pfeffer & Salancik, 1978). Rindfleisch and Heide (1997) suggest that among transaction dimensions, environmental uncertainty seems to be the most problematic construct. Two decisions must be made when operationalizing this construct. First, it must be decided whether this construct is

treated as an objective or perceptual measure. In this study, the decision is to treat environmental uncertainty as a perceptual measure, because decision makers make their decisions based on their perceptions, not on objective numbers (Heide & John, 1995). Degree of environmental uncertainty is in the eye of the beholder (Wathne, 2001).

Other issues are the source for the study and the type of uncertainty (Wathne, 2001). In this study, the sources for the study of the environmental uncertainty construct will be the buyer market. Therefore, the type of uncertainty to be studied is buyer-market unpredictability.

The following items are based on empirical studies (Anderson, 1985; Buvik & Grønhaug, 2000; Celly & Frazier, 1996; Haugland & Reve, 1994; Heide & John, 1990; John & Weitz, 1988, 1989; Wathne, 2001) (three items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

1. Market demand is hard to predict'
2. The sales for this market are hard to predict'
3. The competition in this market is hard to predict'

Opportunism

Opportunism refers to "taking advantage of opportunities with little regard for principles or consequences" (Macneil, 1981) or self-seeking behaviours with guile (Williamson, 1975). Opportunism is likely to degrade the cooperative climate of the relationship, and be negatively related to relational governance. The followed items are based on empirical studies (Rokkan et al., 2003; Wathne & Heide, 2000) (six items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

1. On occasion, this customer lies about certain things to protect its interests.
2. This customer sometimes promises to do things without actually doing them later.
3. This customer does not always act in accordance with contract or agreement.
4. This customer sometimes tries to breach informal agreements between our companies to maximize its benefit.
5. This customer will try to take advantage of "holes" in the contract to further its own interests.
6. This customer sometimes uses unexpected events to extract concessions from my company.

Market governance

Market governance is presumed to have an impact on exchange performance (Haugland & Reve, 2004). In this mode of governance, the buying firm can enjoy benefits from market competition by having many alternatives of supplying firms. Market governance is characterized by market incentives or a pricing system that specifies all relevant information needed to complete and evaluate the product or service delivered by the supplier firm. The following items are based on the study by Haugland and Reve (2004) (three items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

1. This customer draws/drew our attention to competing offerings, so that we work/worked more effectively.
2. This customer monitors/monitored the market to ensure that our offer prices are not substantially higher than other suppliers in the market.
3. This customer will/would change to another supplier if another supplier can deliver this product/service at cheaper price than our company can.

Importance

The complexity of an exchange is presumed to influence the mode of governance (Williamson, 1979; Cannon et al., 2000; Sunde, 2007). In particular, the economic scope of an exchange is presumed to influence how firms organize the transaction. Partners pay more attention to the crafting of a control structure when the exchange is more important. Therefore, the importance of exchange may create spurious effects between independent and dependent variables.

The importance of an exchange is operationalized by measuring the size of an exchange in terms of number of people involved and the financial value.

1. How many people are involved in an exchange?
2. How much is an exchange value?

Past experience

The past experience of exchange partners is presumed to influence mode of governance, because past experience is likely to affect the development of relational governance (Lambe, Spekman, & Hunt, 2000; Sunde, 2007). Therefore, past experience may be the source of spurious effects between independent and dependent variables. The following items are based on Sunde (2007) (two items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

1. Our company has many years of experience with this customer before this exchange.

2. Our company has had a very good relationship with this customer before this exchange.

Future expectations

Expectation about future business is presumed to influence the mode of governance (Sunde, 2007). Based on the "shadow of the future" effect, a firm is likely to perform better if the performance of the present exchange will affect future decisions and future business with its partner. A high expectation of future business will affect the degree of cooperative norms. Therefore, future expectation may be the source of spurious effects between independent and dependent variables. The following items based on Sunde (2007) (two items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

1. Our company expects to have future business with this customer.
2. Our company has a binding agreement to work with this customer in the future.

Product/service characteristics

The characteristics of the product or service may have an impact on transaction costs, which affects the mode of governance (Pilling, Crosby & Jackson, 1994). If an exchanged product or service is a standard one, transaction costs should be low. If it is highly specialized, transaction costs should be high; and partner firms are more likely to adopt a more coordinated mode of governance to reduce such transaction costs. Therefore, product or service characteristics may be the source of spurious effects between independent and dependent variables. The following items are developed (two items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

1. The product/service exchanged is a highly specialized one.
2. Our company invests a lot to facilitate this product/service exchange.
3. This customer invests a lot to facilitate this product/service exchange.

Contract design capability

According to Argyres and Mayer (2007) and Mayer and Argyres (2004), contract design capability is presumed to have a positive impact on performance. The difference between firms' contract capabilities determines the difference between their contract efficiencies. The following measures for this construct have been developed five items, seven-point scale, anchored by "strongly disagree" to "strongly agree"):

1. Contract terms are aligned with contractual risks.

2. The contract has been developed based on previous contracts.
3. Our company and this customer have made efforts to make effective contracts.
4. Different types of employees or outsiders have helped on contract design depending on their expertise.
5. Personnel involved in contract design have learned the trade-offs for different types of contractual provisions.

4.6. Data collection

As there is no archival data available, there is a need to collect primary data. Structured questionnaires and the key informant technique are determined to be suitable when the nature of variables in the theoretical model is considered.

4.6.1. The key informant technique and the number of informants

The key informant technique has been commonly used for collecting data in inter-organizational research. Using this technique, one or a few informants with expert knowledge about the phenomenon of interest are identified (Seidler, 1974). These informants are capable of describing critical factors related to the unit of analysis and are willing to communicate about them (Campbell, 1955; Phillips, 1981). Characteristics of the phenomenon described by informants must also exist independently of the informants (Heide & John, 1995). If informants provide information about themselves, such information does not exist independently of the informants. The research must acquire information from a representative sample of informants (Wathne, 2001).

In this study, critical constructs are related to (a) mode of governance, i.e., level of hierarchical and relational governance, (b) transaction hazard, i.e., level of specific investments, (c) firm power, i.e., type of relationship, (d) negotiation strategy, and (e) relationship performance. All of these phenomena are assumed to be independent of the informants. Researchers can choose informants based on their knowledge instead of their representativeness in a statistical sense (Svendsen, 2005).

Researchers can decide to (a) collect data from one or more informants from an individual organization and (b) collect data from one or both sides of the dyad. These two decisions attract a great deal of discussion (see, e.g., Bagozzi, Yi, & Phillips, 1991; Philips, 1981). The first decision is whether researchers should collect data from one or more informants from the same firm Philips (1981) recommends the use of multiple informants, because there is a low degree of convergence among informants representing the same unit. However, using single-informant

design has become the more dominant approach due to resource constraints and implacability. Since researchers may have limited time and resources, it is not always possible to use multiple informants. In the single-informant design, data can be registered directly as a report of the informant. Investigation is kept at the structural level and incurs less cost (Seidler, 1974). Further, it may be inapplicable to collect data from many informants from the same firm. Some firms may only "establish one person as the focal point for relations with a given supplier" (Heide & John, 1990, p. 30) or customer.

The second decision is whether researchers should collect data from one side or both sides of the dyad. The choice depends on the degree of potential discrepancy between the peerceptions of each exchange partner on the variables in the model. It may be appropriate to collect data from both sides, because researchers can validate the data from one side, compared with those from the other side, to obtain a more accurate value. Many empirical studies adopt this approach (e.g., Anderson & Weitz, 1992; Haugland, 1988; Reve, 1980).

However, if such discrepancies are assumed to be slight, a single-side design is sufficient. Collecting data from both sides is time consuming and requires a lot more resources (Kumar et al., 1993). Since this study had limited time and resources, collecting data from one side of the dyad was more appropriate. Moreover, if data is collected from both sides, the process of analysis also requires more time because there are many observations for the same phenomenon (Kumar, Stern, & Anderson, 1993); the data must be analyzed for convergences, and joint understanding should be reported. There may be interpretation ambiguity that does not occur with single-informant data collection. By using data from one side, the results can be directly reported, and analysis of data divergence is not required.

Another benefit of collecting data from one side of the dyad is that researchers can focus as many observations as possible. Although a multiple-informant design for each relationship is preferred due to its advantage of avoiding or reducing the risk of biased information (Phillips, 1981), collecting data from multiple informants is time consuming and would be likely to reduce the number of observations.

Literature in the field of inter-organization relationships concludes that it is justifiable to conduct a one-sided approach (Heide & John, 1994). Many authors of empirical studies with the same variable in the models argue that there is correspondence between measures of variables, such as perception of transaction characteristics (Heide & John, 1990; Dyer & Chu, 2003), structural form of the relationship (John & Reve, 1982; Reve, 1980), specific

investments and commitment in the relationships (Anderson & Weitz, 1992), and the perception of performance (Anderson & Narus, 1990). Therefore, there seems to be sufficient evidence that there is correspondence between buyer and seller perceptions of the variable in the model. On this basis, it is justifiable to sample from one side of the dyad.

In this study, data was collected from one side of the dyad. General managers in the relevant companies were contacted and asked if they had the knowledge and willingness to be informants. If the general managers were not ready to participate in the research, they were asked to make introductions to their marketing, sales, product, brand managers, or dedicated salespersons. (Since the unit of analysis in this study is the relationship, the choice of informant is the marketing or sales or product or brand managers, or salespersons with in-depth knowledge of the exchange.) Accordingly, the requirements of Campbell (1955), Phillips (1981), and John (1984) were satisfied. Marketing managers have deep understanding about the exchange, customers, and power asymmetry between their firms and their customers' firms.

4.6.2. Data collection procedures

Data was collected in three phases. First, qualitative data was collected from specially selected supplier firms in the O & G industry. Second, informants from the relevant companies were identified. Third, a structured e-questionnaire was prepared and attached to the invitation email.

The first phase consisted of becoming familiar with the empirical setting and making contact with the relevant companies. It also included becoming familiar with the practical use and practical understanding of critical constructs and the hypothesized relationships between them. In this phase, qualitative data was collected through interviews with three specially selected marketing managers in the supplier companies. Additionally, six academic experts were consulted regarding measurements and questionnaire.

In phase two, informants in the supplier companies were identified. The initial sampling frame was 602 contacts. Subsequently, however, during the telephone invitation process, it was found that there were 43 duplications and 49 out-of-scope firms. Therefore, the updated sampling frame was 510 contacts. The companies in the sample range in size from small to very large; and provide a wide variety of products and services that support the O & G industry.

E-questionnaires and reminders were distributed in the third phase. It was necessary to recruit a research assistant whose native language is Norwegian; a bachelor student was found to fill the position. The assistant was trained to approach key informants through telephone calls.

(The telephone call guidelines are presented in Appendix A.) In addition to having a native speaker contact the key informants, two further incentives were included to increase willingness to participate in the survey. First, prospective informants were promised that they would receive the results of the research. Second, every respondent had a chance to win an iPad.

During the telephone conversation, the research assistant asked the prospective respondents if they were knowledgeable, had time, and were interested in joining the survey. They were informed that in return, they might benefit from the research results, and they would have the chance to be the winner of the iPad.

The telephone recruitment began in February 2012 and ended by November of 2012. During two periods, the 17 May national holiday in Norway and the early-June to early-August summer holidays, it was difficult to reach prospective respondents, thereby slowing the process of data collection.

The research assistant made telephone calls to all 602 contacts in the initial sample. He found that there were 43 duplications, 49 out-of-scopes, 32 wrong numbers, 29 answering machines, 11 cases of language difficulties, 43 cases of lack of time, 26 cases of no interest in the survey, 4 cases of organizational constraints, and 16 cases in which the contact could not be reached by phone. As a result, 349 prospective respondents agreed to participate the survey. They were sent an invitation email that included a link to the research webpage. To ensure that the prospective respondents received the invitation email (see Appendix B), the invitation requested that the prospective respondents reply to the email.

Many of the 349 prospective respondents answered without the need for reminder emails. Reminder emails were sent four weeks after the original email. After a further two weeks, if the prospective respondents still had not answered or had answered incompletely, the research assistant made contact by telephone to persuade the respondents to answer the e-questionnaire. Some further responses were received. By the end of November, there were 198 usable responses and 151 incomplete responses. Incomplete responses occurred, for example, when respondents answered some questions but did not proceed to the next questions. These incomplete responses were not used in the data analysis. Therefore, the response rate was 38.82 per cent, calculated from 198 usable responses, divided by 510, which was the updated sampling frame.

The link to the research study (www.nhh.no/oil) was chosen as the result of the advice provided by an academic expert, during the consultation in the first phase, to use a URL that would would be easy for respondents to remember (see Appendix C). The webpage included two links to Part 1 and Part 2 of the e-questionnaire. (Actual links to e-questionnaires were not interpretable and hard to remember). The e-questionnaire was developed using Qualtrics.

The original questionnaire had only one part with 139 questions. However, during the consultation in the first phase, several academics suggested that it be divided into two parts, so that the respondents did not have to finish the questionnaire in one session (see Appendix D). With a two-part format, respondents could complete each part in 10 to 15 minutes. Since the questionnaire was divided, a way to link between the two replies was needed. Therefore a question was added to obtain each respondent's email address. This step was also necessary for the respondents to receive the research results and join the draw for the iPad.

4.7. Summary

This chapter reviews types of research designs and the criteria for selecting research designs. Based on the review, the correlation design (cross-sectional design) is chosen. Validity concerns, including internal validity, external validity, statistical conclusion validity, and construct validity, are described. The empirical setting that requires the existence of key variables in relationships is also described, with the Norwegian oil and gas industry selected as the research context. Sample frame and sample procedures are explained, and measurement issues are addressed. The final section of the chapter addresses issues and procedures of data collection.

5. Analysis and hypotheses testing

This chapter contains all data analysis of this dissertation. It is divided into four sections. Section 5.1 presents the test for hypotheses concerning TCE core predictions and the integration of governance mechanisms and negotiation strategies. Section 5.2 examines the effect of asymmetric-power relationships on TCE, i.e., comparing a group of stronger firms with a group of weaker firms. Section 5.3 is a multi-group analysis that compares the effect of asymmetric and symmetric power on TCE. Section 5.4 is also a multi-group analysis intended to examine whether firms with mutual-dependent relationships and firms with no-interdependent relationships behave differently in the TCE framework.

5.1. Test of the core TCE predictions and their integration with negotiation strategies

This section tests hypotheses concerning the common tenet of TCE, and the integration effect of TCE and negotiation strategies on relationship performance, as developed in Section 3.2. Data used are all 198 observations collected during data collection, as described in Chapter 4. First, in Section 5.1.1, all data were analyzed to determine whether they are multivariate normal distributed. Next, Section 5.1.2 presents the test for the measurement model, using confirmatory factor analysis (CFA). After the measurement model was established, the structural model was analyzed in Section 5.1.3. Section 5.1.4 summarizes the results of hypotheses testing.

5.1.1. Requirements for multivariate analysis

A key step in multivariate data analysis is to examine the input data to determine whether the statistical requirements and assumption of multivariate analysis are followed (Hair et al., 1998). Most common estimators—for example, maximum likelihood (ML)—assume the data are continuous and have a multivariate normal distribution. In this study, the majority of data are ordinal Likert scale. However, researchers may assume that these ordinal variables derive from continuous data and formulate the measurement model based on the underlying continuous variable (Jøreskog, 1993). Non-normal data violates the multivariate normality assumption. Consequently, the standard errors of ML parameter estimates would be too small. Model fit indices are likely to be underestimated. As well as, the model χ^2 statistics would be too big (e.g., Browne, 1982; Satorra, 1992).

Two main causes of non-normal data are kurtosis and skewness. In this section, three measures (Hair et al., 1998) are conducted to check whether the data is non-normal: (a) graphical examination, (b) missing values analysis, and (c) non-normality assessing.

Before the data examination, two observed variables for construct of importance (IMP1 and IMP2) were transformed by taking the natural logarithm of their values. This helped to shift these variables closer to a normal distribution. However, it should be noted that transformation reduces the effects of these variables as they become greater. For example, it is likely that the difference between one and five million Norwegian crones has a greater effect than the difference between 100 and 105 million Norwegian crones.

- Graphical examination

Histograms and frequency tables produced by using IBM SPSS 20 provide better understanding of the data. Observed variables reflecting contract design capabilities, formal contract, past experience, and product or service characteristics, problem-solving negotiation strategies, end-product enhancement outcomes, and satisfaction with the collaboration seem to be skewed towards high values on the Likert scale, while observed variables of exchange length, opportunism, aggressive negotiation strategies, and buying firm's specific investments seem to be skewed toward low values.

- Missing values analysis

Since missing values may lead to bias results, it is necessary to employ a missing values analysis (Hair et al., 1998). In general, missing data were the result of informants not answering all the questions. In this study, the telephone interview and two parts of a web-based questionnaire were used. There are ways to reduce the numbers of missing data.

At the beginning of the questionnaire, informants were asked to fill in their email addresses so that the two parts of their answers could be combined. This step also made it possible to contact informants who did not provide meaningful answers or did not complete the questionnaires. Informants who did not complete the questionnaire were contacted again and asked to complete. However, some informants refused due to time constraint or lack of interest. In total, 151 cases were eliminated because informants did not finish the study. The remaining 198 cases were completed. Therefore, there are no missing values in this study.

- Normality assessing

In addition to the graphical examination, it is necessary to employ statistical tests to assess normality. By checking the values for kurtosis, variables suffering from non-normality can be identified. If kurtosis values of any variable exceed the limit of +/-2.58 (Hair et al., 1998), it is indicated that the data are not from a multivariate normal distribution. Therefore, such variables should be excluded before conducting further analysis.

The descriptive statistics in Appendix E, produced by using IMB SPSS 20, show that 10 observed variables exhibit the evidence of kurtosis: FORM4, AGG5, AGG6, AGG7, AGG8, PAST2, FUT1, and PCHA2. This presence of kurtotic variables is likely to be sufficient to render the distribution as multivariate non-normal.

Violation of the assumption of normal distribution associated with the most common estimator (such as ML) can invalidate statistical hypothesis testing. Therefore, the analysis under Section 5.1 uses robust estimators that adjust the ML estimator to account for non-normality. The term "robust" means that the computed estimates are valid, and even the assumption of normality is violated (Byrne, 2012).

There are several statistical modelling programs that provide data analysis tools for researchers, including LISREL, Mplus, EQS, and AMOS (SPSS). This study includes multi-group analysis. Due to its advanced features, Mplus seems to be the most suitable program for the multi-group analysis. Therefore, further analysis for measurement and structural models are conducted using Mplus Version 7.0.

The Mplus program provides several robust estimators. However, MLM seems to be suitable for this study. It provides robust standard errors and mean adjusted χ^2 statistic. Its χ^2 statistic is referred to as the Satorra-Bentler χ^2, or S-B χ^2. Satorra and Bentler (1988) developed a statistic that adjusts the χ^2 statistic with a scaling correction. S-B χ^2 has been marked as the most reliable test statistic for evaluating covariance structure models with varying distributions and sample sizes (Byrne, 2012). In addition, robust versions of the CFI, TLI, and RMSEA are also provided when using MLM estimators (Byrne, 2012).

5.1.2. Measurement models

Anderson and Gerbing (1988) suggest a two-step approach to model building. First, the researcher should estimate the fit of the measurement model. Next, the researcher can analyze the structural model. Jøreskog (1993) emphasized the necessity of this two-step approach,

indicating that the structural analysis may be meaningless unless the researcher has confirmed that the measurement model holds in the sample.

This section features the measurement model analysis. CFA is performed on the dimensions of hierarchical governance in Section 5.1.2.1, on relational governance in Section 5.1.2.2 and on the full measurement model in Section 5.1.2.3 with the detail of assessment of fits, reliability, and validity. Section 5.1.2.4 presents the summary of the measurement model. The structural analysis is detailed in section 5.1.3.

Assessment of model fit

Before making the model estimations, it is necessary to know how to refer to the extent to which the hypothesized model is consistent with the data. Byrne (1998) suggests that fit assessment should be based on a variety of sources. This study uses five indices, as briefly detailed in Appendix F: χ^2 statistic, comparative fit index (CFI, Bentler, 1990), Tucker-Lewis index (TLI, Tucker & Lewis, 1973), non-normed fit index (NNFI, Bentler & Bonett, 1980), root-mean square error of approximation (RMSEA) (Steiger & Lind, 1980), and standardized root mean square residual (SRMR).

5.1.2.1. The dimensionality of hierarchical governance

Since this study uses two variables to measure hierarchical governance, it is necessary to examine the dimensionality of this construct. There are three possibilities: (a) one-factor model, (b) two-factor model, and (c) second-order model with fixing loadings. All three models were analyzed and compared. The model that best fits the data will be chosen.

One-factor hierarchical governance measurement model

CFA of the application hypothesizes a priori that (a) the hierarchical governance can be explained by one factor and (b) residuals associated with each item are uncorrelated.

- **Model 1**: All nine items from the hierarchical governance dimensions, e.g., formalization (FORM1-5), and centralization (CENT1-4), were used in the priori measurement model. All fit indices exhibited poor fit, as presented in Table G.1 in Appendix G.
- **Model 2**: By removing items with low loading, the hypothesized model of hierarchical governance was re-specified. As a result, the model fits the data very well: MLM $\chi^2_{(2)}$ = 0.249; CFI = 1.000; TLI =1.031; RMSEA = 0.000, 90% CI = (0.000, 0.068), close-

fit test $P = 0.926$; SRMR = 0.007. Therefore, Model 2 was chosen to be the final model for one-factor hierarchical governance. A diagrammatic representation of this final measurement model is presented in Figure G.1 in Appendix G.

Two-factor hierarchical governance measurement model

This section postulates a priori that (a) hierarchical governance is a two-factor structure composed of formalization (FORM) and centralization (CENT); (b) each item-pair measure has a nonzero loading on factor that it was designed to measure and zero loading on all other factors; (c) the two hierarchical governance factors, consistent with the theory, are correlated; and (d) residual errors associated with each measure are uncorrelated.

- **Model 1**: The a priori CFA model exhibited moderate fit (see Table 5.1).
- **Model 2**: The model was re-specified by removing items with the low loading. The model results showed perfect fit. Therefore, the model is chosen to be the final model
- **Model 3:** The model was re-specified by fixing the loadings to the un-standardized estimates acquired in model 2. This produces a model that can be compared with second-order hierarchical governance in the next application. The model is presented schematically in Figure 5.1. The model results became slightly better.

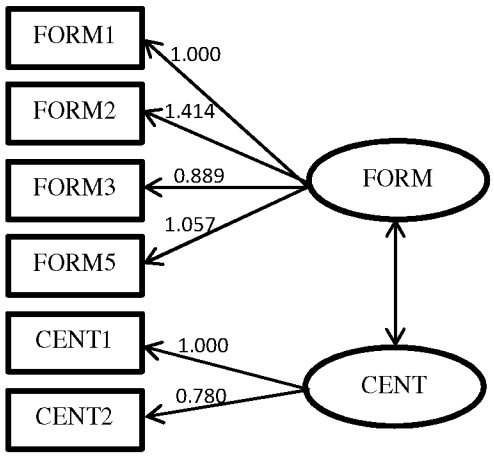

Figure 5.1 Final model for two-factor CFA model of hierarchical governance

Table 5.1 Two-factor hierarchical governance with robust estimators
Note: In model 3, loadings were fixed as the values behind @ sign

	MLM χ^2 (*df*), P-Value	RMSEA estimate, 90% C.I., Close-fit test *P*	CFI	TLI	SRMR	Remaining items	Specification
M1	70.590(26), 0.0000	0.093, 0.067-0.119, 0.004	0.899	0.860	0.099	FORM1 FORM2 FORM3 FORM5 CENT1 CENT2 CENT3 CENT4	
M2	1.222(8), 0.9964	0.000, 0.000-0.000 0.999	1.000	1.043	0.011	FORM1 FORM2 FORM3 FORM5 CENT1 CENT2	FORM4 CENT3 CENT4 were removed.
M3	1.249(12), 1.0000	0.000, 0.000-0.000	1.000	1.046	0.011	FORM1@1.000 FORM2@1.414 FORM3@0.889 FORM5@1.057 CENT1@1.000 CENT2@0.780	FORM4 CENT3 CENT4 were removed. Loadings were fixed to un-standardized estimates in model4

Second-order measurement model for hierarchical governance

The present application hypothesizes a priori that (a) hierarchical governance can be explained by two first-order factors (formalization: FORM and centralization: CENT) and one second-order factor (hierarchical governance: HRCH); (b) each item has a nonzero loading on the first-order factor it was designed to measure, and zero loadings on the other first-order factor; (c) all factor loadings are fixed to the un-standardized factor loadings acquired from two-factor model, revealing which model has a better fit; (d) residuals associated with each item are uncorrelated; and (e) covariation among the two first-order factors is explained fully by their regression on the second-order factor.

- **Model 1**: The result showed that the a priori model was non-convergent and could not be identified, since the standard error of HRCH cannot be computed. This means that the model does not fit the data.
- **Model 2**: The model was re-specified by fixing the loadings of first-order constructs (i.e., FORM and CENT) to 0.5. This provided Mplus with more information. The model became convergent. The fit indices showed perfect fit. This model is chosen to be the final model for the second-order construct of hierarchical governance. The schematic model is presented in Figure H.1 in Appendix H.1.

In summary, it is evident that of the three models, the latter two are equally good. However, the decision was made to choose the two-factor model, because using a second-order model represents the opportunity to have less fit structural model in the further analysis. Therefore, in

this study, hierarchical governance is explained by two different factors: formalization and centralization.

5.1.2.2. The dimensionality of relational governance

With regard to relational governance, the research literature does not concur on how the construct should be conceptualized. Some researchers measure it as a unidimensional construct (e.g., Cannon, Achrol et al., 2000; Poppo & Zenger; 2002), while others treat it as multiple constructs (i.e., different norms) or multi-dimensional construct consisting of many norms (e.g., Heide & John, 1992; Noordewier, John et al., 1990). Therefore, the decision was made to perform CFA for: (a) a one-factor model, (b) a four-factor model, and (c) a second-order model with fixed loadings. The results could then be compared to determine which structure better fit the data. The test is similar to the test for dimensionality of hierarchical governance. (See Appendix I for details of how the test was conducted.)

In summary, it is evident that of the three models, the four-factor model delivers the most fitting indices. Based on these findings, the conclusion is that relational governance is better explained by four different constructs or norms. A diagrammatic representation of the final measurement model for relational governance is presented in Figured I.2 in Appendix I.

5.1.2.3. The full measurement model

In this section, the full measurement model is analyzed, following the same approach as the CFA of two-factor hierarchical governance in the previous section. It postulates a priori that:

a. The full measurement model consists of the following constructs: formalization (ξ_1 = FORM), centralization (ξ_2 = CENT), flexibility (ξ_3 = FLEX), solidarity (ξ_4 = SOL), information exchange (ξ_5 = INF), restraint to the use of power (ξ_6 = RPW), supplier-held specific investments (ξ_7 = SSI), buyer-held specific investments (ξ_8 =BSI), problem-solving negotiation strategy (ξ_9 = PSV), aggressive negotiation strategy (ξ_{10} = AGG), cost reduction outcomes (ξ_{11} = CRO), end-product enhancement outcomes (ξ_{12} = EPE), satisfaction with collaboration (ξ_{13} = SAT). All control variables were also included in the measurement model. They include environmental uncertainty (ξ_{14} = UNC), opportunisms (ξ_{15} = OPP), market governance (ξ_{16} = MKT), importance (ξ_{17} = IMP), exchange length (ξ_{18} = EXLG), past experience (ξ_{19} = PAST), future expectation (ξ_{20} = FUT), product/service characteristics (ξ_{21} = PCHA), and contract design capability (ξ_{22} = CDC).

b. Each item-pair measure has a nonzero loading on the factor that it was designed to measure and zero loading on all other factors.
c. All factor loadings of FORM, CENT, FLEX, SOL, INF, and RPW are fixed to un-standardized factor loadings acquired from their final measurement models in Section 5.1.2.1 and 5.1.2.2. This is ensure the location of these concepts (Anderson & Gerbing ,1988);
d. All constructs are correlated to achieve the strongest test of measurement model (Jøreskog, 1993).
e. Residual errors associated with each measure are uncorrelated.
f. The covariance matrix of the constructs was unconstrained. Therefore, a lack of fit can be attributed only to the relations among the measures and their error terms.

The CFA model was run and modified several times; the model results showed good fit: MLM $\chi^2_{(612)} = 704.159$; CFI = 0.969; TLI =0.961; RMSEA = 0.028, 90% CI = (0.016, 0.037), close-fit test $P = 1.000$; SRMR = 0.045. The final model is presented schematically in Figure 5.2.

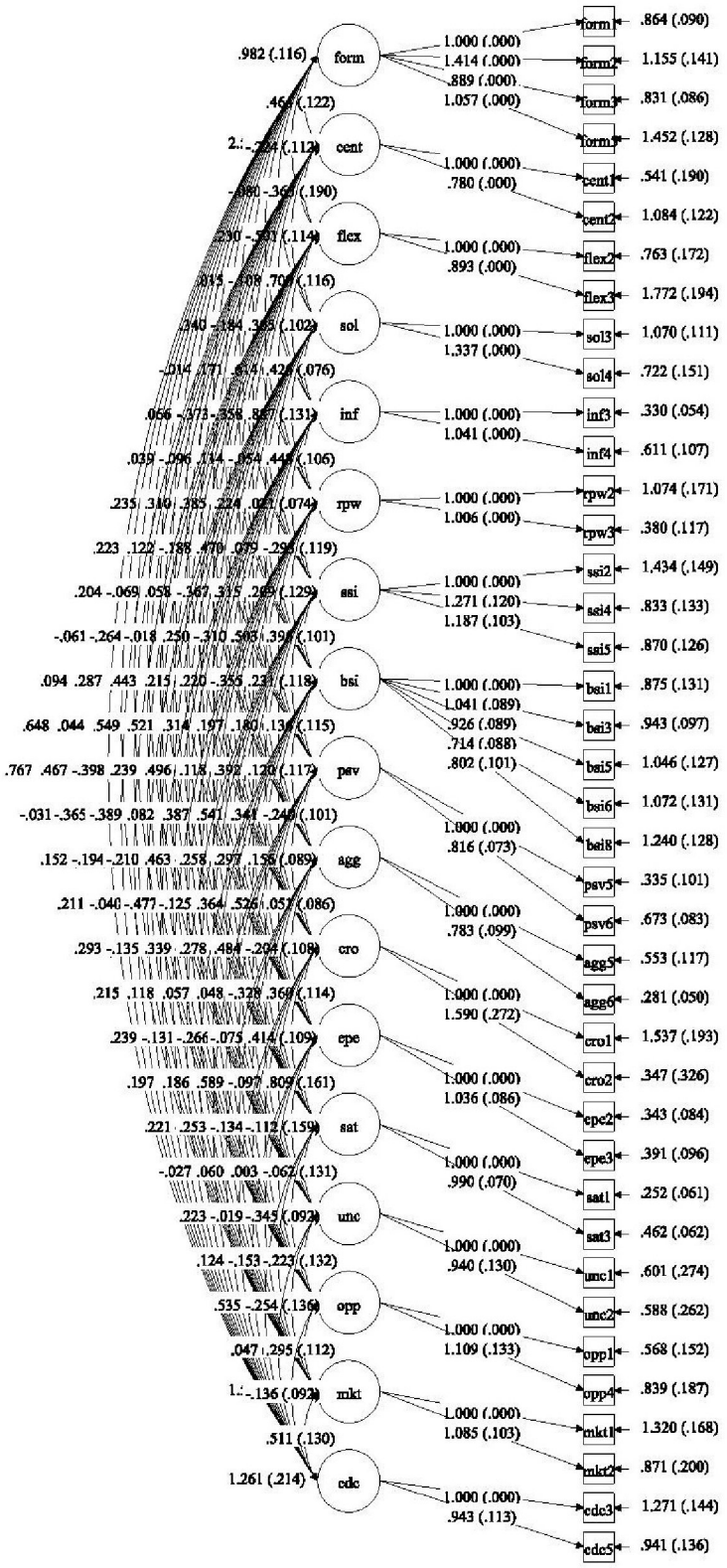

Figure 5.2 The full measurement model, un-standardized estimates

Assessment of measurement model

In the previous section, a full measurement model was established with good global fit indices. However, the internal fit of the model should be justified. In evaluating the measurement model, the focus is also on the relationships between the latent variables and their indicator variables or items. The purpose is to determine the reliability and validity.

- Reliability

Reliability refers to the consistency of measurement. Four evaluation criteria for reliability measures are suggested by Bagozzi and Yi (1988). First, the parameter estimates and their significance should be evaluated. The cut-off criterion for factor loading is 0.6, and must be significant by the *t*-value greater 1.96 in absolute terms. Second, the individual item reliability or measurement reliability should be evaluated. This statistic is defined as the extent to which the variance of the observed variable is explained by the true score that the variable is supposed to measure (Lord & Novick, 1968). Since all individual items in this model are loaded only on one factor, this value is the reliability of the observed variable as an indicator of the underlying construct. There are no definite rules about the cut-off values for this statistic. Third, the scale reliability or composite reliability of the constructs should be evaluated. This value should be greater than 0.6. Fourth, the average variance extracted should be evaluated. The value should be greater than 0.5.

The results of testing the full measurement model are presented in Table 5.2. All measures have significant parameter estimates greater than the 0.6 cut-off. All individual item reliabilities are high and satisfactory. Composite reliabilities of all constructs are greater than the 0.6 cut-off. All values of average variance extracted are higher than the 0.5 cut-off.

Table 5.2 The full measurement model

Note to the table: (a) called R-SQUARE in the Mplus 7.0 output, (b) calculated as the square of the highest correlation of each construct

	Factor loading		**Error term**		**Item reliability (a)**	**Composite reliability**	**Average variance extracted**	**Highest shared variance(b)**
	Standardized estimate	t-values	Standardized estimate	t-values				
Formal contract (ξ_{1})						0.81	0.52	0.47
FORM1	0.729	26.872	0.468	11.815	0.532			
FORM2	0.794	29.141	0.370	8.568	0.630			
FORM3	0.695	26.511	0.517	14.192	0.483			
FORM5	0.656	22.275	0.570	14.740	0.430			
Centralization (ξ_{2})						0.83	0.71	0.11
CENT1	0.909	27.677	0.173	2.893	0.827			
CENT2	0.770	31.136	0.408	10.715	0.592			
Flexibility (ξ_{3})						0.75	0.60	0.26
FLEX2	0.853	24.654	0.273	4.632	0.727			
FLEX3	0.691	21.703	0.523	11.884	0.477			
Solidarity (ξ_{4})						0.73	0.58	0.42
SOL3	0.679	23.012	0.539	13.440	0.461			
SOL4	0.833	22.672	0.306	5.000	0.694			
Information exchange (ξ_{5})						0.77	0.63	0.28
INF3	0.829	30.470	0.312	6.918	0.688			
INF4	0.751	18.090	0.436	7.002	0.564			
Restraint to the use of power (ξ_{6})						0.86	0.75	0.42
RPW2	0.809	27.200	0.346	7.191	0.654			
RPW3	0.919	35.105	0.156	3.250	0.844			
Supplier-held specific investments (ξ_{7})						0.82	0.61	0.16
SSI2	0.675	15.771	0.544	9.406	0.456			
SSI4	0.836	25.905	0.300	5.559	0.700			
SSI5	0.813	24.728	0.339	6.352	0.661			
Buyer-held specific investments (ξ_{8})						0.83	0.50	0.10
BSI1	0.771	19.151	0.406	6.540	0.594			
BSI3	0.772	22.564	0.405	7.667	0.595			
BSI5	0.716	16.505	0.488	7.852	0.512			
BSI6	0.615	11.202	0.621	9.195	0.379			
BSI8	0.632	12.699	0.601	9.553	0.399			
Problem-solving negotiation strategy (ξ_{9})						0.81	0.68	0.19
PSV5	0.891	24.016	0.206	3.106	0.794			
PSV6	0.749	18.086	0.438	7.059	0.562			
Aggressive negotiation strategy (ξ_{10})						0.81	0.67	0.29
AGG5	0.808	16.764	0.347	4.446	0.653			
AGG6	0.834	28.930	0.305	6.353	0.695			
Cost reduction outcomes (ξ_{11})						0.75	0.61	0.16
CRO1	0.604	9.363	0.635	8.133	0.365			
CRO2	0.930	13.594	0.135	1.057	0.865			
End-product enhancement outcomes (ξ_{12})						0.89	0.81	0.36
EPE2	0.902	29.307	0.186	3.352	0.814			
EPE3	0.897	31.355	0.195	3.808	0.805			
Satisfaction with collaboration (ξ_{13})						0.87	0.77	0.36
SAT1	0.910	37.127	0.171	3.842	0.829			
SAT3	0.849	31.125	0.279	6.024	0.721			
Environmental uncertainty (ξ_{14})						0.87	0.76	0.07
UNC1	0.878	14.742	0.228	2.181	0.772			
UNC2	0.868	13.593	0.247	2.229	0.753			
Opportunisms (ξ_{15})						0.79	0.65	0.29
OPP1	0.820	15.973	0.327	3.885	0.673			
OPP4	0.795	15.074	0.369	4.399	0.631			
Market governance (ξ_{16})						0.75	0.60	0.28
MKT1	0.732	17.313	0.464	7.498	0.536			
MKT2	0.821	18.935	0.327	4.591	0.673			
Contract design capability (ξ_{22})						0.68	0.52	0.47
CDC3	0.706	15.796	0.502	7.963	0.498			
CDC5	0.737	15.998	0.456	6.711	0.544			

- Validity

This section evaluates the construct validity of the measures, i.e., "the degree to which a measure assesses the construct it is purported to assess (Peter, 1981, p. 134)." *Convergent validity* represents the extent to which items of a given construct vary with the construct. *Discriminant validity* represents the extent to which items of a given construct differ from items of other constructs in the same model.

Anderson and Gerbing (1988) suggest the evaluation method for these two validities. The test for convergent validity is carried out by examining the statistical significance of the paths between each latent variable and its indicators. These values, presented in Table 5.2, show that all factor-loading estimates are significant, i.e., *t*-values are above 2.33 in absolute terms. Therefore, it the conclusion is that convergent validity can be claimed.

Discriminant validity is satisfactory and can be claimed by two tests. First, the correlation among the latent construct is determined by calculating a 95% confidential interval (5^{th} and 95^{th} percentile) around the correlation estimate for each of the latent constructs in the measurement model. Table 5.3 presents the correlation estimates between the latent constructs and their standard errors. There was no pair of latent construct that was perfectly correlated. However, high correlation was found between:

- FORM (ξ_1) and CDC (ξ_{22}) at 0.689 with its corresponding confidence interval between 0.557 and 0.820.
- SOL (ξ_4) and RPW (ξ_6) at 0.651 with its corresponding confidence interval between 0.541 and 0.761.
- EPE (ξ_{12}) and SAT (ξ_{13}) at 0.599 with its corresponding confidence interval between 0.548 and 0.721.
- AGG (ξ_{10}) and OPP (ξ_{15}) at 0.534 with its corresponding confidence interval between 0.387 and 0.681.
- FORM (ξ_1) and MKT (ξ_{16}) at 0.530 with its corresponding confidence interval between 0.405 and 0.655.
- INF (ξ_5) and SAT (ξ_{13}) at 0.527 with its corresponding confidence interval between 0.394 and 0.660.
- FLEX (ξ_3) and SOL (ξ_4) at 0.513 with its corresponding confidence interval between 0.380 and 0.646.

Second, according to Fornell and Larcker (1981), if the average variance extracted for each latent variable is higher than its highest shared variance, discriminant validity is demonstrated. Average variance extracted was calculated and is presented in Table 5.2. Shared variance is a square of correlations between the latent variables. This highest of each latent variable is also

presented in Table 5.3. It is evident that all average variances extracted are greater than the highest shared variance. Therefore, the conclusion is that discriminant validity can be claimed.

Table 5.3 Correlation matrix for the full measurement model. Standard errors in parentheses, insignificant correlations in italics, and the highest correlation for each variable in bold

	FORM	CENT	FLEX	SOL	INF	RPW	SSI	BSI	PSV	AGG	CRO	EPE	SAT	UNC	OPP	MKT	CDC
FORM	1.00																
CENT	0.291 (0.069)	1.00															
FLEX	-0.159 (0.078)	*-0.159 (0.083)*	1.00														
SOL	*-0.084 (0.087)*	**-0.326 (0.66)**	**0.513 (0.068)**	1.00													
INF	0.272 (0.083)	*-0.078 (0.082)*	0.251 (0.079)	0.521 (0.063)	1.00												
RPW	*0.010 (0.078)*	*-0.080 (0.068)*	0.302 (0.074)	**0.651 (0.056)**	0.369 (0.069)	1.00											
SSI	0.313 (0.078)	*0.097 (0.073)*	-0.229 (0.071)	*-0.052 (0.080)*	*0.022 (0.079)*	-0.188 (0.075)	1.00										
BSI	*-0.013 (0.083)*	-0.205 (0.076)	*0.071 (0.081)*	0.207 (0.071)	*0.082 (0.073)*	*0.130 (0.075)*	0.319 (0.068)	1.00									
PSV	*0.058 (0.080)*	*-0.052 (0.063)*	0.237 (0.078)	**0.431 (0.076)**	0.325 (0.068)	0.310 (0.078)	0.185 (0.086)	*0.105 (0.087)*	1.00								
AGG	*0.039 (0.073)*	0.188 (0.67)	*-0.129 (0.094)*	-0.376 (0.081)	-0.356 (0.077)	-0.244 (0.079)	0.161 (0.071)	*0.104 (0.100)*	-0.206 (0.086)	1.00							
CRO	0.252 (0.073)	*0.081 (0.073)*	*0.043 (0.074)*	0.278 (0.082)	0.275 (0.080)	*0.147 (0.077)*	0.380 (0.072)	**0.320 (0.068)**	*0.145 (0.078)*	*0.053 (0.087)*	1.00						
EPE	0.184 (0.072)	*-0.035 (0.072)*	*-0.010 (0.076)*	0.184 (0.080)	0.300 (0.070)	*0.068 (0.079)*	**0.403 (0.064)**	0.214 (0.064)	0.377 (0.096)	-0.163 (0.081)	0.312 (0.075)	1.00					
SAT	0.187 (0.082)	-0.149 (0.070)	0.282 (0.075)	0.493 (0.070)	**0.527 (0.068)**	0.246 (0.074)	0.214 (0.079)	0.291 (0.061)	0.386 (0.078)	-0.291 (0.075)	**0.399 (0.071)**	**0.599 (0.062)**	1.00				
UNC	*-0.043 (0.081)*	*0.125 (0.074)*	0.271 (0.075)	0.175 (0.077)	*0.067 (0.084)*	0.228 (0.073)	*-0.080 (0.075)*	0.173 (0.078)	*0.029 (0.082)*	*-0.051 (0.088)*	*-0.072 (0.073)*	*-0.064 (0.090)*	*-0.040 (0.083)*	1.00			
OPP	*0.088 (0.074)*	*0.025 (0.075)*	-0.259 (0.077)	-0.376 (0.082)	-0.228 (0.084)	-0.310 (0.075)	0.286 (0.069)	*0.047 (0.073)*	-0.216 (0.079)	**0.534 (0.075)**	*-0.132 (0.081)*	*0.003 (0.086)*	-0.289 (0.077)	*-0.144 (0.080)*	1.00		
MKT	**0.530 (0.064)**	0.235 (0.071)	-0.207 (0.083)	*-0.164 (0.090)*	*-0.038 (0.082)*	*-0.077 (0.081)*	*0.087 (0.071)*	*-0.094 (0.079)*	*0.133 (0.076)*	0.201 (0.068)	*0.052 (0.077)*	*-0.012 (0.070)*	*-0.112 (0.076)*	-0.144 (0.075)	0.221 (0.076)	1.00	
CDC	**0.689 (0.067)**	*-0.017 (0.080)*	*0.095 (0.086)*	0.197 (0.088)	0.306 (0.086)	*0.134 (0.081)*	0.194 (0.075)	0.155 (0.075)	0.173 (0.082)	*-0.023 (0.071)*	0.211 (0.077)	*0.090 (0.077)*	**0.432 (0.069)**	*0.029 (0.080)*	*-0.112 (0.074)*	0.368 (0.079)	1.00

5.1.2.4. Summary and conclusions of the measurement model

The requirements for multivariate analysis were considered, using graphical examination, missing value analysis, and non-normality testing. Some observed variables showed skewness in the histogram chart, while some items failed the test of zero kurtosis. Therefore, robust estimation that accounts for non-normality will be used for hypothesis testing.

Establishment of the measurement model began with the test dimensionality for construct of hierarchical governance, followed by relational governance. The two-factor and four-factor models fit the data better than other structural models. Next, the six constructs and other latent variables were included in the full measurement model and confirmatory factors were analyzed. After several modifications, the full measurement model demonstrated good fit in all indices.

Convergent validity was achieved, since all latent variables presented satisfactory composite reliability and average variance extracted, while all factor-loading estimates were significant.

Discriminant validity was satisfactory, since no pairs of any latent constructs are perfectly correlated and average variance extracted of each latent construct was higher than its highest shared variance.

5.1.3. Structural analysis

In this section, all hypotheses under Section 3.2 concerning the common tenet of TCE, the incorporation of relational governance into TCE, and the integration of governance modes and negotiation strategies are tested. All data used are observations (N = 198). This test constitutes the later part of the two-step approach of Anderson and Gerbing (1998). Section 5.1.3.1 presents results from the test of direct effects. Section 5.1.3.2 presents results from the test for interaction. Section 5.1.3.3 presents results from the test for full model. SEM was used to analyze the direct effect and interaction effect models in the research model, with the help of Mplus 7.0.

5.1.3.1. Testing sub-model 1 with reduced form hypotheses 1 - 6

This application tests direct effects. As presented in Figure 5.3, the direct effect hypotheses of the model consist of (a) the hypothesized effects of supplier-held and buyer-held specific investments on hierarchical and relational governance and (b) the hypothesized effects of hierarchical governance, relational governance, aggressive negotiation strategy, and problem-solving negotiation strategy on cost reduction outcomes, end-product enhancement outcomes, and satisfaction with collaboration.

Testing strategy, model fit, and results

The hypotheses were tested by estimating the model from the observed sample covariance matrix and using the robust maximum likelihood estimator with Satorra-Bentler-scaling (due to the non-normality of the data, as explained in Section 5.1.1).

First, CFA was performed on the measurement model. The measurement model in this case is similar to the full measurement in the Section 5.1.2.3, in that all the factor loadings were fixed to the un-standardized estimates as in the final full measurement. This ensures that the constructs being measured in the present application are the same as those in the final full measurement model (Anderson & Gerbing, 1998). Interpretational confounding can be overcome; however, control variables were not included in this application.

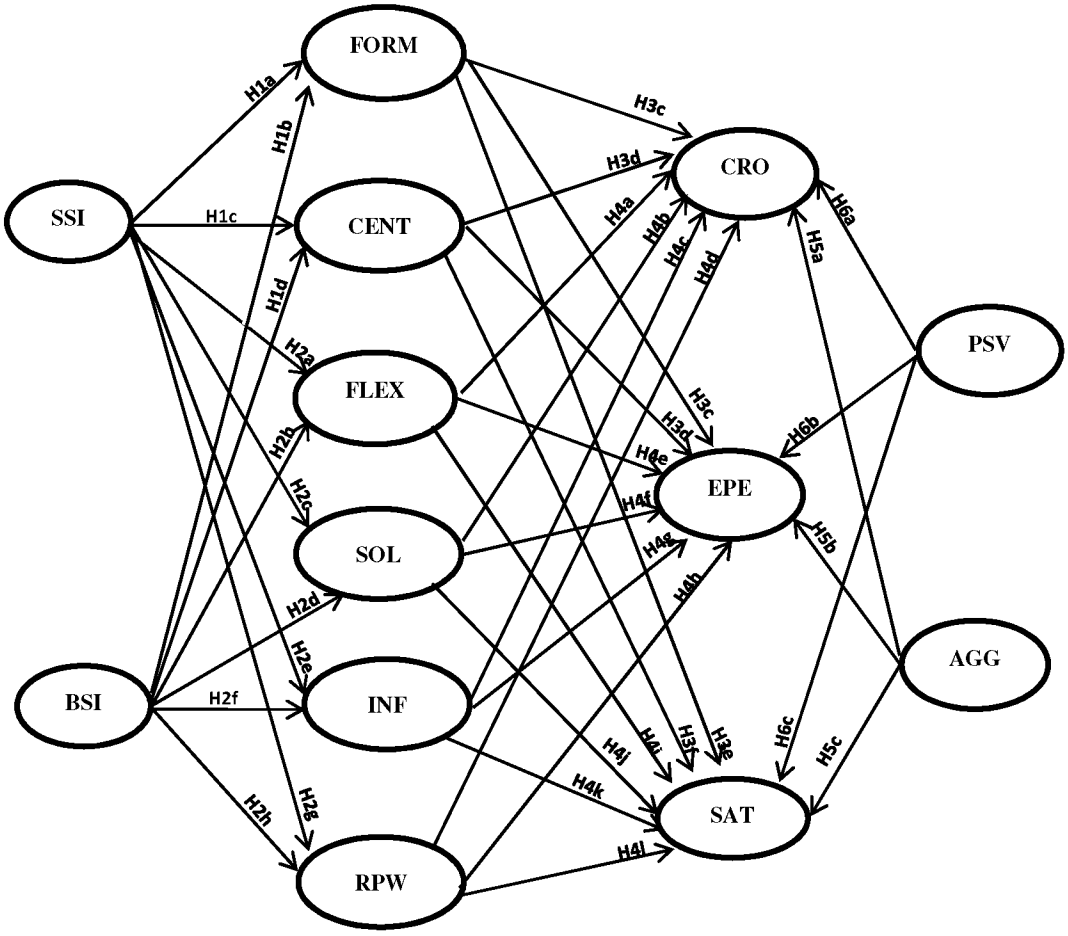

Figure 5.3 The direct effect model: the sub-model 1 with reduced-form Hypotheses 1-6
Note: SSI: supplier-held specific investments, BSI: Buyer-held specific investments, FORM: Formalization, CENT: Centralization, FLEX: Flexibility, SOL: Solidarity, INF: Information exchange, RPW: Restraint to the use of power, CRO: Cost reduction outcome, EPE: End-product enhancement outcome, SAT: Satisfaction with collaboration, PSV: Problem-solving negotiation strategy, AGG: Aggressive negotiation strategy

First, the results obtained by running the model showed that it fit that data well: MLM$\chi^2_{(405)}$ = 429.746; CFI = 0.989; TLI =0.987; RMSEA = 0.018 (90% CI: 0.000, 0.031), close-fit test P = 1.000; SRMR = 0.045. Next, the structural model was analyzed. In a test of the structural model, the fit index was highly significantly different from the measurement model: corrected Δ MLM$\chi^2_{(33)}$ = 247.725, P = 0.0. Therefore, imposing relations between latent variables results in a significantly worse fit of the model. However, based on the model fit indices of the structural model per se, many fit indices exhibited reasonable fit: MLM$\chi^2_{(438)}$ = 661.791; CFI = 0.903; TLI =0.890; RMSEA = 0.051 (90% CI: 0.043, 0.059), close-fit test P = 0.426; SRMR = 0.102.

The model results are presented in the Table 5.4. Hypothesis 1 was partially supported. Supplier-held specific investments have significant positive effects on formalization (0.349, *P* = 0.000) and centralization (0.351, *P* = 0.001), while buyer-held specific investments have a significant negative effect on centralization (- 0.443, *P* = 0.000) and a marginally significant negative effect on formalization (-0.111, *P* =0.069).

Hypothesis 2 was partially supported. Supplier-held specific investments have significant negative effects on flexibility (- 0.468, *P* = 0.000), solidarity (- 0.206, *P* = 0.003), and restraint to the use of power (- 0.418, *P* = 0.000), but no effect on information exchange (- 0.044, *P* = 0.257). Buyer-held specific investments have significant positive effects on flexibility (0.314, *P* = 0.003), solidarity (0.348, *P* = 0.000), information exchange (0.144, *P* = 0.011), and restraint to the use of power (0.374, *P* = 0.000).

Hypothesis 3 was partially supported. Formalization has significant positive effects on cost reduction outcomes (0.203, *P* =0.002), end-product enhancement outcomes (0.175, *P* =0.026), and satisfaction with the collaboration (0.186, *P* =0.014). Centralization has a marginally significant positive effect on cost reduction outcomes (0.050, *P* =0.090), but no effects on end-product enhancement outcomes (-0.028, *P* =0.285) and satisfaction with the collaboration (-0.048, *P* =0.106).

Hypothesis 4 was partially supported. Flexibility has a significant negative effect on end-product enhancement outcomes (- 0.106, *P* =0.040), and a significant positive effect on satisfaction with collaboration (0.074, *P* =0.027), but no effect on cost reduction outcomes (-0.052, *P* =0.135). Solidarity has significant positive effects on cost reduction outcomes (0.347, *P* =0.000), and satisfaction with collaboration (0.319, *P* =0.000), but no effect on end-product enhancement outcomes (-0.102, *P* =0.096). Information exchange has significant positive effects on cost reduction outcomes (0.187, *P* =0.008), end-product enhancement outcomes (0.273, *P* =0.003), and satisfaction with the collaboration (0.405, *P* =0.000). Restraint to the use of power has no effects on cost reduction outcomes (-0.018, *P* =0.341), end-product enhancement outcomes (-0.087, *P* =0.062), and satisfaction with the collaboration (-0.063, *P* =0.080).

Hypothesis 5 was rejected. Aggressive strategy has a significant positive effect on cost reduction outcomes (0.172, *P* =0.007), but has no effects on end-product enhancement outcomes (- 0.043, *P* =0.314), and satisfaction with the collaboration (- 0.082, *P* =0.121).

Hypothesis 6 was partially supported. Problem-solving strategy has no effect on cost reduction outcomes (0.047, P =0.182), but significant positive effects on end-product enhancement outcomes (0.375, P =0.000), and satisfaction with the collaboration (0.194, P =0.001).

Table 5.4 Test of sub-model 1 with reduced-from hypotheses 1 - 6 (n=198)

Structural linkage in the model	Sign	Estimates	One - tailed P-value
Dependent variable: **Formalization**			
H1a: Supplier-held specific investments	+	**0.349**	**0.000**
H1b: Buyer-held specific investments	+	-0.111	0.069
Dependent variable: **Centralization**			
H1c: Supplier-held specific investments	+	**0.351**	**0.001**
H1d: Buyer-held specific investments	+	**-0.443**	**0.000**
Dependent variable: **Flexibility**			
H2a: Supplier-held specific investments	+	**-0.468**	**0.000**
H2b: Buyer-held specific investments	+	**0.314**	**0.003**
Dependent variable: **Solidarity**			
H2c: Supplier-held specific investments	+	**-0.206**	**0.003**
H2d: Buyer-held specific investments	+	**0.348**	**0.000**
Dependent variable: **Information exchange**			
H2e: Supplier-held specific investments	+	-0.044	0.257
H2f: Buyer-held specific investments	+	**0.144**	**0.011**
Dependent variable: **Restraint to the use of power**			
H2g: Supplier-held specific investments	+	**-0.418**	**0.000**
H2h: Buyer-held specific investments	+	**0.374**	**0.000**
Dependent variable: **Cost reduction outcomes**			
H3a: Formalization	+	**0.203**	**0.002**
H3b: Centralization	+	0.050	0.090
H4a: Flexibility	+	-0.052	0.135
H4b: Solidarity	+	**0.347**	**0.000**
H4c: Information exchange	+	**0.187**	**0.008**
H4d: Restraint to the use of power	+	-0.018	0.341
H5a: Aggressive negotiation strategy	-	**0.172**	**0.007**
H6a: Problem-solving negotiation strategy	+	0.047	0.182
Dependent variable: **End-product enhancement outcomes**			
H3c: Formalization	+	**0.175**	**0.026**
H3d: Centralization	+	-0.028	0.285
H4e: Flexibility	+	**-0.106**	**0.040**
H4f: Solidarity	+	-0.102	0.096
H4g: Information exchange	+	**0.273**	**0.003**
H4h: Restraint to the use of power	+	-0.087	0.062
H5b: Aggressive negotiation strategy	-	-0.043	0.314
H6b: Problem-solving negotiation strategy	+	**0.375**	**0.000**
Dependent variable: **Satisfaction with the collaboration**			
H3e: Formalization	+	**0.186**	**0.014**
H3f: Centralization	+	-0.048	0.106
H4i: Flexibility	+	**0.074**	**0.027**
H4j: Solidarity	+	**0.319**	**0.000**
H4k: Information exchange	+	**0.405**	**0.000**
H4l: Restraint to the use of power	+	-0.063	0.080
H5c: Aggressive negotiation strategy	-	-0.082	0.121
H6c: Problem-solving negotiation strategy	+	**0.194**	**0.001**
MLM$\chi^2_{(438)}$=661.791, P =0.0000; CFI = 0.903; TLI =0.890; RMSEA = 0.051, 90% CI =(0.043, 0.059), close-fit test P = 0.426; SRMR = 0.102 Unstandardized parameter estimates of the effects, paths significant at 5% level in bold.			

5.1.3.2. Analysis of interaction effects: Testing sub-model 2 with reduced form hypotheses 7 - 12

This section tests hypotheses regarding (a) the alignment between specific investments and modes of governance,with hierarchical and relational governance expected to strengthen the positive relationships between specific investments and relationship performance; and (b) the interaction between mode of governance and negotiation strategy, with problem solving negotiation strategy hypothesized to strengthen the effect of mode of governance on relationship performance and aggressive strategy expected to reduce this effect.

Testing strategy, model fit, and results

The testing of interactions involving latent variables has been a challenge (Wang & Wang, 2012). Although many techniques for testing these interaction effects have been suggested, most of them are extremely complicated and time consuming. Since the model in this study has many interactions of interest, the chosen technique and software should ease the analysis process. Of the statistical modelling programs, Mplus provides the most advanced and least complicated coding process. Therefore, Mplus was used in this study. The Mplus program uses the *product indicant* to create a new variable that is the product of the two observed variables.

The measurement model used in this analysis of interaction effects is the same model used in the analysis of direct effects. Therefore, the measurement model should produce the same good fit statistic, and there should no problem of interpretational confounding.

With these 72 hypotheses, there are 10 dimensions of integration and 1000 integration points. The results could not be generated by running the interaction model with Mplus 7.0, since the model was non-convergent. This was probably because the model was too big for Mplus 7.0. Therefore, preliminary tests were done by testing each interaction individually to see whether it was statistically significant. If it was significant, it was included in the model in the further analysis.

Preliminary test of interaction effects

The interaction SEMs tested in the present application are preliminary hypothesis testing for all individual interaction effects under Section 5.1. They are 24 single-interaction models. In each model, the interaction was an independent variable and relationship performance was a dependent variable. An example of the hypothesized model of this preliminary test is presented

in Figure 5.4. It depicts the interaction between supplier-held specific investments and formalization on cost reduction outcomes, end-product enhancement outcomes, and satisfaction with the collaboration.

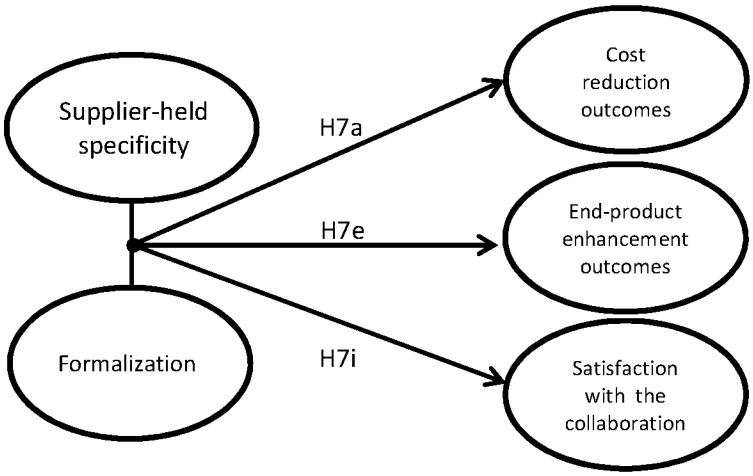

Figure 5.4 Hypothesized single-interaction model

Appendix J presents the results of the each interaction model. Most interaction models were convergent in the first run. Some were not. These non-convergent interaction models were modified by including the interactions from the convergent model. For example, the interaction model between centralization and problem solving was originally non-convergent. The model was modified by adding the interaction of formalization and problem solving and the direct effect of formalization. The additional interaction effect was fixed to the unstandardized estimates acquired from the interaction model of formalization and problem-solving negotiation strategy. The result is that nine interactions have significant effects. These 9 interactions or 17 interaction effects will be included in the model in further analysis. They include the following:

- Interaction of buyer-held specific investments and formalization on cost reduction outcomes (-0.208, P = 0.033), and satisfaction with the collaboration (-0.289, P = 0.021).
- Interaction of supplier-held specific investments and centralization on end-product enhancement outcomes (1.060, P = 0.022).
- Interaction of buyer-held specific investments and centralization on cost reduction outcomes (1.236, P = 0.032), end-product enhancement outcomes (1.686, P = 0.005), and satisfaction with the collaboration (1.423, P = 0.005).

- Interaction of buyer-held specific investments and flexibility on cost reduction outcomes (-0.400, P = 0.042) and end-product enhancement outcomes (-0.694, P = 0.000).
- Interaction of buyer-held specific investments and solidarity on cost reduction outcomes (-0.212, P = 0.042).
- Interaction of buyer-held specific investments and information exchange on cost reduction outcomes (-0.231, P = 0.039) and end-product enhancement outcomes (-0.314, P = 0.031).
- Interaction of buyer-held specific investments and restraint to the use of power on cost reduction outcomes (-4.772, P = 0.038), end-product enhancement outcomes (-5.810, P = 0.010), and satisfaction with the collaboration (-7.268, P = 0.000).
- Interaction of centralization and problem-solving negotiation strategy on cost reduction outcomes (0.107, P = 0.041) and end-product enhancement outcomes (0.107, P = 0.011).
- Interaction of information exchange and problem-solving negotiation strategy on end-product enhancement outcomes (-0.278, P = 0.014).

5.1.3.3. Testing the full structural model including direct and interaction effects with hypotheses 1 - 12

This application includes direct effects and interaction effects in the same model. All 36 direct effects were included; only 17 significant interaction effects found in preliminary tests were included. In addition, all factor loadings were fixed to the un-standardized estimates found in the final full measurement model in Section 5.1.2.3. Control variables were not included.

A run of the model showed that it was non-convergent. This was probably because the model was too complex due to many integration points for Mplus 7.0.

The model was then modified by adding the starting values to all effects. These starting values were taken from the estimates in the direct effect model (see Table 5.4), and from the estimates in the preliminary interaction effect model (see Appendix J). However, the model was still non-convergent. Therefore, the model was divided into two sub-models: (a) sub-model 3, in which hierarchical governance is the safeguarding mechanism and (b) sub-model 4, in which relational governance is the governance mode used.

5.1.3.3.1. Testing sub-model 3 with reduced form hypotheses 1, 3, 5, 6, 7, 9, 10

This section tests the alignment of specific investments and hierarchical governance and the interaction of hierarchical governance and negotiation strategies. The SEM tested in the application tests hypotheses regarding (a) the path leading from supplier-held and buyer-held specific investments to two dimensions of hierarchical governance; (b) the path leading from two dimensions of hierarchical governance to three dimensions of relationship performance; (c) the path leading from negotiation strategies to relationship performance; (d) the path leading from the significant interaction effects, found in preliminary tests, between specific investments and the two dimensions of hierarchical governance on relationship performance; (e) the path leading form the significant interaction effects, found in preliminary tests, between two dimensions of hierarchical governance and negotiation strategies; and (f) the path leading from supplier-held or buyer-held specific investments to relationship performance only if their interaction effects were significant in the preliminary test. The postulated structure of the model to be tested is presented schematically in Figure 5.5.

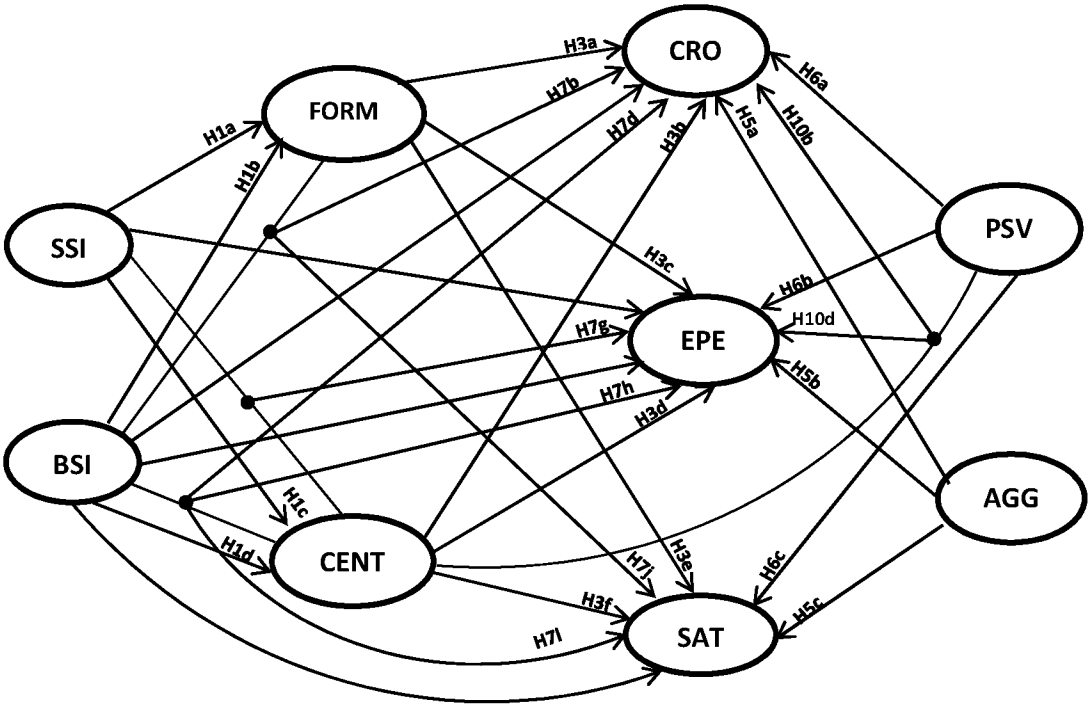

Figure 5.5 Hypothesized sub-model 3

Note: SSI: supplier-held specific investments, BSI: Buyer-held specific investments, FORM: Formalization, CENT: Centralization, CRO: Cost reduction outcome, EPE: End-product enhancement outcome, SAT: Satisfaction with collaboration, PSV: Problem-solving negotiation strategy, AGG: Aggressive negotiation strategy

Running the model produced the results shown in Table 5.5. Hypothesis 1 was partially supported. Hypotheses 1a and 1c were supported. Supplier-held specific investments have

significant positive effects on formalization (0.618, $P = 0.000$) and centralization (0.768, $P = 0.002$). Hypotheses 1b and 1d were rejected. Buyer-held specific-investments have significant negative effects on formalization (-0.313, $P = 0.008$) and centralization (-0.741, $P = 0.002$).

Hypothesis 3 was partially supported. Hypotheses 3a and 3e were supported. Formalization has significant positive effects on cost reduction outcomes (0.321, $P = 0.008$) and satisfaction with the collaboration (0.322, $P = 0.014$). Hypotheses 3b, 3c, 3d, and 3f were rejected. Formalization has no effect on end-product enhancement outcomes (0.101, $P = 0.308$). Centralization has no effects on cost reduction outcomes (0.034, $P = 0.327$), end-product enhancement outcomes (-0.082, $P = 0.232$), and satisfaction with the collaboration (-0.078, $P = 0.205$).

Hypothesis 5 was partially supported. Hypotheses 5b and 5c were supported. Aggressive negotiation strategy has significant negative effects on end-product enhancement outcomes (-0.259, $P = 0.037$) and satisfaction with the collaboration (-0.319, $P = 0.002$). Hypothesis 5a was rejected. Aggressive negotiation strategy has no effect on cost reduction outcomes (-0.025, $P = 0.411$).

Hypothesis 6 was rejected. Hypotheses 6a, 6b, and 6c were rejected. Problem-solving negotiation strategy has no effects on cost reduction outcomes (0.050, $P = 0.356$), or end-product enhancement outcomes (0.210, $P = 0.128$), and has a weak significant positive effect on satisfaction with the collaboration (0.250, $P = 0.052$).

Hypothesis 7 was rejected. Six preliminary findings of significant interactions (H7b, H7d, H7g, H7h, H7j, and H7l) were not supported. Hypothesis 7b (the interaction of buyer-held specific investments and formalization) has no effect on cost reduction outcomes (-0.231, $P = 0.103$). Hypothesis 7d (the interaction of buyer-held specific investments and centralization) has a marginally significant positive effect on cost reduction outcomes (0.139, $P = 0.063$). Hypothesis 7g (the interaction of supplier-held specific investments and centralization) has no effect on end-product enhancement outcomes (-0.028, $P = 0.422$). Hypothesis 7h (the interaction of buyer-held specific investments and centralization) has no effect on end-product enhancement outcomes (0.111, $P = 0.206$). Hypothesis 7j (the interaction of buyer-held specific investments and formalization) has no effect on satisfaction with the collaboration (-0.249, $P = 0.092$). Hypothesis 7l (the interaction of buyer-held specific investments and centralization) has no effect on satisfaction with the collaboration (0.100, $P = 0.130$).

Hypothesis 9 was rejected. However, sub-hypotheses 9a - 9f were rejected during the preliminary test. They are therefore not included in the sub-model 3.

Hypothesis 10 was partially supported. Hypothesis 10d was supported. The interaction of centralization and problem-solving negotiation strategy has a significant positive effect on end-product enhancement outcomes (0.193, $P = 0.038$). The preliminary finding of significance for hypothesis 10b was not supported. The interaction of centralization and problem-solving negotiation strategy has no effect on cost reduction outcomes (0.046, $P = 0.296$).

Testing sub-model 3 including control variables

To account for spurious associations and other competing explanations, control variables are included in sub-model 3. The control variables are uncertainty, market governance, and contract design capability.

The hypothesized model is the sub-model 3 including (a) the path leading from uncertainty to two dimensions of hierarchical governance and (b) the path leading from market governance and contract design capability to relationship performance. The measurement model was established in Section 5.1.2.3.

A run of the model produced the results presented in Table 5.5. To consider which model is better, researchers usually use the test for χ^2 difference. However, when a model has interaction effects, Mplus does not provide χ^2 statistics. Instead, it provides Bayesian information criterion (BIC), with the value difference between two models used for model comparison. The model with a small BIC has a better fit. Raftery (1996) suggests that if the difference in absolute value of BIC is between zero and two, there is weak evidence favouring one model against another model. If ΔBIC is between two and six, there is positive evidence. If ΔBIC is between 6 and 10, there is strong evidence. If ΔBIC is greater than 10, there is very strong evidence.

The BIC of the sub-model 3 is less than the BIC of the present model. The ΔBIC is equal to 4134.459, indicating very strong evidence that the sub-model 3 has a better fit than this present model. This increases the confidence in the sub-model 3. In addition, among the control variables, only contract design capability has a significant effect; it also has a positive effect on satisfaction with the collaboration. When we compare the sizes and significance levels between sub-model 3 and the present model, we can see some slight changes. Most changes are in the form of a drop in significant level from significant to marginally significant. The significant positive effects of contract design capability on satisfaction with the collaboration can be explained by high correlation between the two constructs (see Table 5.3). Moreover, the

apparent replacement of formalization by contract design capability can also be explained by the high correlation between these two constructs.

Structural linkage in the model	Sub-model3		Including control variables	
	Estimates	One-tailed P-value	Estimates	One-tailed P-value
Dependent variable: **Formalization**				
H1a: Supplier-held specific investments	**0.618**	**0.000**	**0.380**	**0.028**
H1b: Buyer-held specific investments	**-0.313**	**0.008**	-0.136	0.257
Uncertainty			0.004	0.487
Dependent variable: **Centralization**				
H1c: Supplier-held specific investments	**0.768**	**0.002**	0.376	0.093
H1d: Buyer-held specific investments	**-0.741**	**0.002**	-0.501	0.052
Uncertainty			0.221	0.072
Dependent variable: **Cost reduction outcomes**				
Buyer-held specific investments	**0.345**	**0.003**	**0.296**	**0.039**
H3a: Formalization	**0.321**	**0.008**	0.271	0.063
H3b: Centralization	0.034	0.327	0.029	0.397
H5a: Aggressive negotiation strategy	-0.025	0.411	0.011	0.420
H6a: Problem-solving negotiation strategy	0.050	0.356	0.044	0.390
H7b: Buyer-held specific investments*Formalization	-0.231	0.103	-0.188	0.175
H7d: Buyer-held specific investments*Centralization	0.139	0.063	0.092	0.162
H10b: Centralization *Problem-solving negotiation strategy	0.046	0.296	0.066	0.264
Market governance			-0.042	0.373
Contract design capability			0.029	0.426
Dependent variable: **End-product enhancement outcomes**				
Supplier-held specific investments	**0.482**	**0.023**	**0.348**	**0.013**
Buyer-held specific investments	0.031	0.440	0.126	0.260
H3c: Formalization	0.101	0.308	0.236	0.143
H3d: Centralization (CENT)	-0.082	0.232	-0.071	0.307
H5b: Aggressive negotiation strategy	**-0.259**	**0.037**	-0.214	0.097
H6b: Problem-solving negotiation strategy (PSV)	0.210	0.128	0.291	0.045
H7g: Supplier-held specific investments*Centralization	-0.028	0.422	0.031	0.405
H7h: Buyer-held specific investments*Centralization	0.111	0.206	0.050	0.374
H10d: CENT*PSV	**0.193**	**0.038**	0.152	0.063
Market governance			-0.061	0.356
Contract design capability			-0.123	0.281
Dependent variable: **Satisfaction with the collaboration**				
Buyer-held specific investments	**0.324**	**0.019**	0.202	0.139
H3e: Formalization	**0.322**	**0.014**	0.175	0.200
H3f: Centralization	-0.078	0.205	-0.048	0.352
H5c: Aggressive negotiation strategy	**-0.319**	**0.002**	-0.214	0.070
H6c: Problem-solving negotiation strategy	0.250	0.052	0.252	0.072
H7j: Buyer-held specific investments*Formalization	-0.249	0.092	-0.202	0.165
H7l: Buyer-held specific investments*Centralization	0.100	0.130	0.068	0.294
Market governance			-0.243	0.069
Contract design capability			**0.364**	**0.032**
Unstandardized parameter estimates of the effects, paths significant at 5% level in bold.				

5.1.3.3.2. Testing sub-model 4 with reduced form hypotheses 2, 4, 5, 6, 8, 11, 12

This section tests the alignment of specific investments and relational governance and the interaction of relational governance and negotiation strategies. The SEM tested in the application tests hypotheses regarding (a) the path leading from supplier-held and buyer-held specific investments to four dimensions of relational governance; (b) the path leading from four dimensions of relational governance to three dimensions of relationship performance; (c) the path leading from negotiation strategies to relationship performance; (d) the path leading from the significant interaction effects, found in preliminary tests, between specific investments and the four dimensions of relational governance to relationship performance; (e) the path leading form the significant interaction effects, found in preliminary tests, between four dimensions of relational governance and negotiation strategies; and (f) the path leading from supplier-held or buyer-held specific investments to relationship performance only if their interaction effects were significant in the preliminary test.

A run of the model showed that it was non-convergent. This may have been due to the complexity of the model. The model was then modified by fixing the path coefficients between specific investments and relational governance to un-standardized estimates acquired from sub-model 1. However, the model was still non-convergent.

Therefore, sub-model 4 was divided into two sub-models, i.e., sub-models 4.1 and 4.2. Sub-model 4.1 emphasizes the interaction of specific investments and relational governance, while sub-model 4.2 focuses on the interaction of relational governance and negotiation strategies.

5.1.3.3.2.1. Testing sub-model 4.1 with reduced form hypotheses

This application tests the alignment of specific investments and relational governance. The SEM tested in the application tests hypotheses regarding (a) the path leading from supplier-held and buyer-held specific investments to four dimensions of relational governance; (b) the path leading from four dimensions of relat11ional governance to three dimensions of relationship performance; (c) the path leading from negotiation strategies to relationship performance; (d) the path leading from the significant interaction effects, found in preliminary tests, between specific investments and the four dimensions of relational governance to relationship performance; and (e) the path leading from supplier-held or buyer-held specific investments to relationship performance, only if their interaction effects were significant in the preliminary test.

Sub-model 4.1: Running sub-model 4.1 showed that it was non-convergent.

Sub-model 4.1b: The model was modified by fixing the path coefficients between specific investments and four dimensions of relational governance to un-standardized estimates acquired from sub-model 1. This provided more information for MPlus. The postulated structure of the model to be tested is presented schematically in Figure 5.6.

The sub-model 4.1b was convergent. The model results are shown in Table 5.6. Hypothesis 4 was partially supported. Hypothesis 4k was supported. Information exchange has a significant positive effect on satisfaction with the collaboration (0.446, $P = 0.006$). Hypotheses 4a, 4b, 4c, 4d, 4e, 4f, 4g, 4h, 4i, 4j, and 4l were rejected. Flexibility has no effects on cost reduction outcomes (-0.066, $P = 0.242$), end-product enhancement outcomes (-0.103, $P = 0.186$), and satisfaction with the collaboration (0.065, $P = 0.263$). Solidarity has no effects on cost reduction outcomes (0.128, $P = 0.233$), end-product enhancement outcomes (-0.042, $P = 0.418$), and satisfaction with the collaboration (0.219, $P = 0.132$). Information exchange has no effects on cost reduction outcomes (0.220, $P = 0.112$) and end-product enhancement outcomes (0.224, $P = 0.165$). Restraint to the use of power has no effects on cost reduction outcomes (-0.023, $P = 0.415$), end-product enhancement outcomes (-0.072, $P = 0.280$), and satisfaction with the collaboration (-0.076, $P = 0.224$).

Hypothesis 5 was rejected. Aggressive negotiation strategy has no effects on cost reduction outcomes (0.132, $P = 0.205$), end-product enhancement outcomes (-0.093, $P = 0.280$), and satisfaction with the collaboration (-0.128, $P = 0.130$).

Hypothesis 6 was partially supported. Hypothesis 6b was supported. Problem-solving negotiation strategy has a significant positive effect on end-product enhancement outcomes (0.360, $P = 0.003$). It has no effects on cost reduction outcomes (0.029, $P = 0.410$) and satisfaction with the collaboration (0.173, $P = 0.072$).

Hypothesis 8 was rejected. Hypotheses 8b, 8d, 8f, 8h, 8n, 8p, 8r, and 8x were rejected, though each has significant effects in preliminary tests.

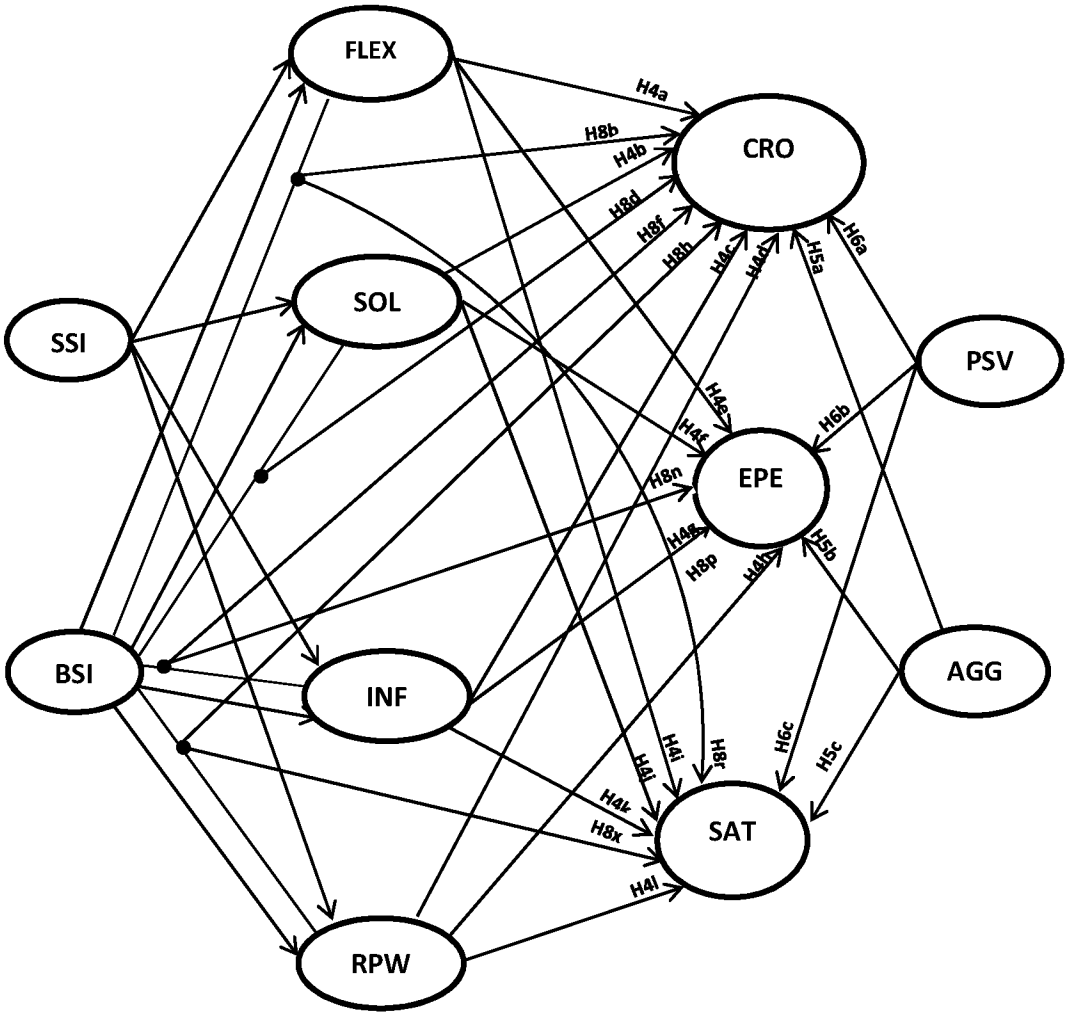

Figure 5.6 Hypothesized sub-model 4.1b of the alignment of specific investments and relational governance

Table 5.6 Results from testing sub-model 4.1b

Structural linkage in the model	Sign	Estimates	One-tailed P-value
Dependent variable: **Flexibility**			
Supplier-held specific investments		-0.468	999.0
Buyer-held specific investments		0.314	999.0
Dependent variable: **Solidarity**			
Supplier-held specific investments		-0.206	999.0
Buyer-held specific investments		0.348	999.0
Dependent variable: **Information exchange**			
Supplier-held specific investments		-0.044	999.0
Buyer-held specific investments		0.144	999.0
Dependent variable: **Restraint to the use of power**			
Supplier-held specific investments		-0.418	999.0
Buyer-held specific investments		0.374	999.0
Dependent variable: **Cost reduction outcomes**			
Buyer-held specific investments	**+**	**0.291**	**0.027**
H4a: Flexibility	+	-0.066	0.242
H4b: Solidarity	+	0.128	0.233
H4c : Information exchange	+	0.220	0.112
H4d : Restraint to the use of power	+	-0.023	0.415
H5a: Aggressive negotiation strategy	-	0.132	0.205
H6a: Problem-solving negotiation strategy	+	0.029	0.410
H8b: Buyer-held specific investments*Flexibility	+	-0.069	0.256
H8d: Buyer-held specific investments*Solidarity	+	-0.113	0.289
H8f: Buyer-held specific investments*Information exchange	+	-0.079	0.355
H8h: Buyer-held specific investments*Restraint to the use of power	+	-0.016	0.440
Dependent variable: **End-product enhancement outcomes**			
Buyer-held specific investments	+	0.242	0.065
H4e: Flexibility	+	-0.103	0.186
H4f: Solidarity	+	-0.042	0.418
H4g : Information exchange	+	0.224	0.165
H4h : Restraint to the use of power	+	-0.072	0.280
H5b: Aggressive negotiation strategy	-	-0.093	0.280
H6b: Problem-solving negotiation strategy	**+**	**0.360**	**0.003**
H8n: Buyer-held specific investments*Information exchange	+	-0.232	0.146
H8p: Buyer-held specific investments*Restraint to the use of power	+	0.050	0.350
Dependent variable: **Satisfaction with the collaboration**			
Buyer-held specific investments	+	0.215	0.086
H4i: Flexibility	+	0.065	0.263
H4j: Solidarity	+	0.219	0.132
H4k : Information exchange	**+**	**0.446**	**0.006**
H4l: Restraint to the use of power	+	-0.076	0.224
H5c: Aggressive negotiation strategy	-	-0.128	0.130
H6c: Problem-solving negotiation strategy	+	0.173	0.072
H8r: Buyer-held specific investments*Flexibility	+	-0.012	0.451
H8x: Buyer-held specific investments*Restraint to the use of power	+	0.006	0.480
Unstandardized parameter estimates of the effects, paths significant at 5% level in bold.			

Testing sub-model 4.1b including control variables

To account for spurious associations and other competing explanations, control variables are included in sub-model 4.1b. The control variables are opportunism, market governance and contract design capability.

The hypothesized model is the sub-model 4.1b including (a) the path leading from opportunism to four dimensions of relational governance and (b) the path leading from market governance and contract design capability to relationship performance. The measurement model was established in Section 5.1.2.3.

Running the model showed that it was non-convergent, indicating very strong evidence that the sub-model 4.1b has a better fit than the present model. This increases the confidence in the sub-model 4.1b.

5.1.3.3.2.2. Testing sub-model 4.2 with reduced form hypotheses

The present application tests the interaction of relational governance and negotiation strategies. The SEM tested in the application hypotheses regarding (a) the path leading from supplier-held and buyer-held specific investments to four dimensions of relational governance; (b) the path leading from four dimensions of relational governance to three dimensions of relationship performance; (c) the path leading from negotiation strategies to relationship performance; and (d) the path leading from the significant interaction effects, found in preliminary tests, between relational governance and negotiation strategy to relationship performance.

Sub-model 4.2: A run of the sub-model 4.2 showed that it was non-convergent, and that it needed the modification.

Sub-model 4.2b: The model was modified by fixing the path coefficients between supplier-held and buyer-held specific investments and four dimensions of relational governance to un-standardized estimates acquired from sub-model 1. The postulated structure of the model to be tested is presented schematically in Figure 5.7.

The model then converged. The model results are shown in Table 5.7. Hypothesis 4 was partly supported. Hypothesis 4k was supported. Information exchange has a significant positive effect on satisfaction with the collaboration (0.465, $P = 0.002$). Hypotheses 4a, 4b, 4c, 4d, 4e, 4f, 4g, 4h, 4i, 4j, and 4l were rejected. Flexibility has no effects on cost reduction outcomes (-0.080, $P = 0.190$), end-product enhancement outcomes (-0.138, $P = 0.089$), and satisfaction with the

collaboration (0.054, $P = 0.167$). Solidarity has no effects on cost reduction outcomes (0.276, $P = 0.059$), end-product enhancement outcomes (0.114, $P = 0.285$), and satisfaction with the collaboration (0.314, $P = 0.054$). Information exchange has no effects on cost reduction outcomes (0.271, $P = 0.050$) and end-product enhancement outcomes (0.309, $P = 0.065$). Restraint to the use of power has no effects on cost reduction outcomes (-0.010, $P = 0.459$), end-product enhancement outcomes (-0.082, $P = 0.234$), and satisfaction with the collaboration (-0.066, $P = 0.236$).

Hypothesis 5 was rejected. Aggressive negotiation strategy has no effects on cost reduction outcomes (0.202, $P = 0.082$), end-product enhancement outcomes (-0.021, $P = 0.448$), and satisfaction with the collaboration (-0.075, $P = 0.248$).

Hypothesis 6 was partially supported. Hypothesis 6b and 6c were supported. Problem-solving negotiation strategy has significant positive effects on end-product enhancement outcomes (0.379, $P = 0.003$) and satisfaction with the collaboration (0.202, $P = 0.050$). It has no effect on cost reduction outcomes (0.068, $P = 0.291$).

Hypothesis 12 was rejected. Hypothesis 12g was rejected. Interaction of information exchange and problem-solving negotiation strategy has a significant negative effect on end-product enhancement outcomes (-0268, $P = 0.021$).

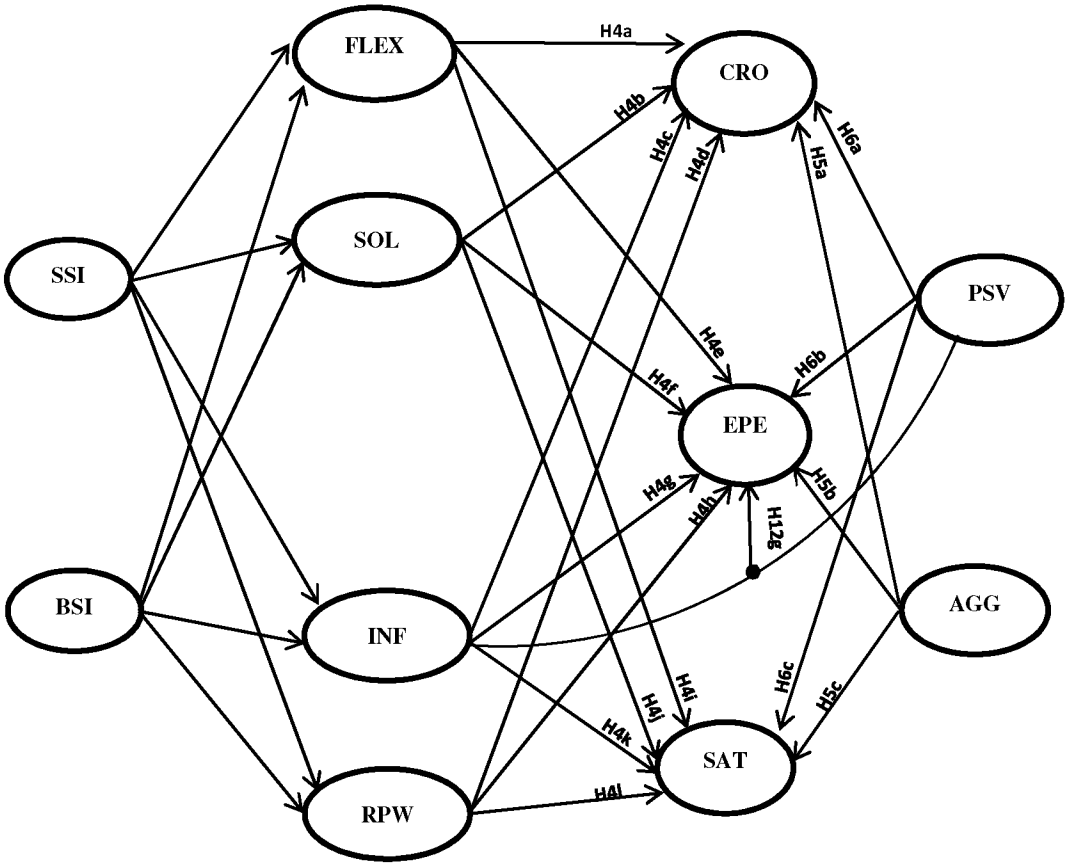

Figure 5.7 Hypothesized model of the alignment of specific investments and relational governance

Testing sub-model 4.2b including control variables

To account for spurious associations and other competing explanations, control variables are included in model 4.2b. The control variables are opportunism, market governance and contract design capability.

The hypothesized model is the sub-model 4.1b including (a) the path leading from opportunism to four dimensions of relational governance and (b) the path leading from market governance and contract design capability to relationship performance. The measurement model was established in Section 5.1.2.3.

A run of the model produced the results presented in Table 5.7. The BIC of the sub-model 4.2b is less than the BIC of the present model. The ΔBIC is equal to 4152.625, indicating very strong evidence that the sub-model 4.2b has a better fit than the present model (Raftery, 1996). This increases the confidence in the sub-model 4.2b. With regard to the control variable, opportunism has significant negative effects on all four dimensions of relational governance. Contract design capability has a significant effect, and it has a positive effect on satisfaction with the collaboration. When the sizes and significance levels of sub-model 4.2b and the present model are compared, some slight changes can be seen. Most changes occur in the form of a drop in significant level from significant to marginally significant. This provides additional support for the sub-model 4.2b.

Table 5.7 Results from testing sub-model 4.2b including control variables

Structural linkage in the model	Sub-model 4.2b		Including control variables	
	Estimates	One-tailed P-value	Estimates	One-tailed P-value
Dependent variable: **Flexibility**				
Supplier-held specific investments	-0.468	999.0	-0.468	999.0
Buyer-held specific investments	0.314	999.0	0.314	999.0
Opportunism			-0.801	0.019
Dependent variable: **Solidarity**				
Supplier-held specific investments	-0.206	999.0	-0.206	999.0
Buyer-held specific investments	0.348	999.0	0.348	999.0
Opportunism			**-0.968**	**0.001**
Dependent variable: **Information exchange**				
Supplier-held specific investments	-0.044	999.0	-0.206	999.0
Buyer-held specific investments	0.144	999.0	0.348	999.0
Opportunism			**-0.570**	**0.005**
Dependent variable: **Restraint to the use of power**				
Supplier-held specific investments	-0.418	999.0	-0.206	999.0
Buyer-held specific investments	0.374	999.0	0.348	999.0
Opportunism			**-1.008**	**0.001**
Dependent variable: **Cost reduction outcomes**				
H4a: Flexibility	-0.080	0.190	-0.106	0.225
H4b: Solidarity	0.276	0.059	0.245	0.234
H4c: Information exchange	0.271	0.050	0.243	0.188
H4d: Restraint to the use of power	-0.010	0.459	-0.029	0.421
H5a: Aggressive negotiation strategy	0.202	0.082	0.233	0.125
H6a: Problem-solving negotiation strategy	0.068	0.291	0.113	0.324
Market governance			-0.086	0.278
Contract design capability			0.195	0.140
Dependent variable: **End-product enhancement outcomes**				
H4e: Flexibility	-0.138	0.089	-0.162	0.139
H4f: Solidarity	0.114	0.285	-0.212	0.316
H4g : Information exchange (INF)	0.309	0.065	0.342	0.158
H4h : Restraint to the use of power	-0.082	0.234	-0.071	0.337
H5b: Aggressive negotiation strategy	-0.021	0.448	-0.022	0.460
H6b: Problem-solving negotiation strategy (PSV)	**0.379**	**0.003**	**0.614**	**0.032**
H12g: INF*PSV	**-0.268**	**0.021**	-0.357	0.067
Market governance			-0.178	0.197
Contract design capability			0.124	0.291
Dependent variable: **Satisfaction with collaboration**				
H4i: Flexibility	0.054	0.167	0.017	0.442
H4j: Solidarity	0.314	0.054	0.145	0.335
H4k: Information exchange	**0.465**	**0.002**	0.344	0.095
H4l: Restraint to the use of power	-0.066	0.236	-0.096	0.217
H5c: Aggressive negotiation strategy	-0.075	0.248	-0.031	0.429
H6c: Problem-solving negotiation strategy	**0.202**	**0.050**	0.320	0.076
Market governance			-0.273	0.060
Contract design capability			**0.459**	**0.008**
Unstandardized parameter estimates of the effects, paths significant at 5% level in bold.				

5.1.4. Summary of results

The results of testing the hypothesized model in Section 5.1 are presented in Table 5.8. This sub-section presents the short summary of results. The explanation and discussion of the results are presented in Chapter 6. The parameter estimates in the model are based on the parameter estimates obtained from using Satorra-Bentler scaling, due to the non-normality of the data.

In sub-model 1, it was found that supplier-held specific investments have significant positive effects on formalization and centralization, significant negative effects on flexibility, solidarity, and restraint to the use of power, and no effect on information exchange. In contrast, buyer-held specific investments have a significant negative effect on centralization and no effect on formalization, while they have significant positive effects on all four norms of relational governance. With regard to association between governance mechanisms and relationship performance, formalization has significant positive effects on all three dimensions of relationship performance; centralization has no effect. Flexibility has significant positive effects on end-product enhancement outcomes and satisfaction with the collaboration, but has no effect on cost reduction outcomes. Solidarity has significant positive effects on cost reduction outcomes and satisfaction with the collaboration, but no effect on end-production enhancement outcomes. Information exchange has significant positive effects on all relationship performance. In contrast, restraint to the use of power has no effects on all outcomes. With regard to relationship between negotiation strategy and relationship performance, aggressive strategy has a significant positive effect on cost reduction outcomes, but no effects on the other two relationship performance outcomes. Problem-solving strategy has significant positive effects on end-product enhancement outcomes and satisfaction with collaboration, but no effect on cost reduction outcomes.

In sub-model 3, it was found that supplier-held specific investments have significant positive effects on both dimensions of hierarchical governance, but buyer-held specific investments have a significant negative effect on them. With regard to antecedents of relationship performance, formalization has significant positive effects on cost reduction outcomes and satisfaction with collaboration, but no effect on end-product enhancement outcomes. Centralization has no effects on all three performance outcomes. Aggressive negotiation strategy has significant negative effects on end-product enhancement outcomes and satisfaction with the collaboration, but no effect on cost reduction outcomes. Problem-solving strategy has no effects on all three performance outcomes. With regard to interaction effect, only interaction

between centralization and problem-solving strategy has a significant positive effect on end-product enhancement outcomes. Other interactions have no effects.

In sub-model 4.1b, it was found that problem-solving negotiation strategy has a significant positive effect on end-product enhancement outcomes. Information exchange has a significant positive effect on satisfaction with the collaboration. Other dimensions of relational governance, negotiation strategies, and interactions have no effects on relationship performance.

In sub-model 4.2b, information exchange has a significant positive effect on cost reduction outcomes. Information exchange has a significant positive effect on satisfaction with collaboration. Other dimensions of relational governance have no effects on relationship performance. Problem-solving negotiation strategy has significant positive effects on end-product enhancement outcomes and satisfaction with the collaboration, but no effect on cost reduction outcomes. Aggressive negotiation strategy has no effect on relationship performance. With regard to interaction effect, information exchange and problem-solving negotiation strategy have significant negative interaction effects on end-product enhancement outcomes.

Table 5.8 Summary of hypothesis testing under Section 5.1

Structural linkage in the model	Sub-model 1		Sub-model 3		Sub-model 4.1b		Sub-model 4.2b	
	Estimates	One-tailed P-value	Estimates	One-tailed P-value	Estimates	One-tailed P-value	Estimates	One-tailed P-value
Dep. var.: **FORM**								
H1a: SSI	**0.349**	**0.000**	**0.618**	**0.000**				
H1b: BSI	-0.111	0.069	**-0.313**	**0.008**				
Dep. var.: **CENT**								
H1c: SSI	**0.351**	**0.001**	**0.768**	**0.002**				
H1d: BSI	**-0.443**	**0.000**	**-0.741**	**0.002**				
Dep. var.: **FLEX**								
H2a: SSI	**-0.468**	**0.000**			-0.468	999.0	-0.468	999.0
H2b: BSI	**0.314**	**0.003**			0.314	999.0	0.314	999.0
Dep. var.: **SOL**								
H2c: SSI	**-0.206**	**0.003**			-0.206	999.0	-0.206	999.0
H2d: BSI	**0.348**	**0.000**			0.348	999.0	0.348	999.0
Dep. var.: **INF**								
H2e: SSI	-0.044	0.257			-0.044	999.0	-0.044	999.0
H2f: BSI	**0.144**	**0.011**			0.144	999.0	0.144	999.0
Dep. var.: **RPW**								
H2g: SSI	**-0.418**	**0.000**			-0.418	999.0	-0.418	999.0
H2h: BSI	**0.374**	**0.000**			0.374	999.0	0.374	999.0
Dep. var.: **CRO**								
BSI			**0.345**	**0.003**	**0.291**	**0.027**		
H3a: FORM	**0.203**	**0.002**	**0.321**	**0.008**				
H3b: CENT	0.050	0.090	0.034	0.327				
H4a: FLEX	-0.052	0.135			-0.066	0.242	-0.080	0.190
H4b: SOL	**0.347**	**0.000**			0.128	0.233	0.276	0.059
H4c: INF	**0.187**	**0.008**			0.220	0.112	**0.271**	**0.050**
H4d: RPW	-0.018	0.341			-0.023	0.415	-0.010	0.459
H5a: AGG	**0.172**	**0.007**	-0.025	0.411	0.132	0.205	0.202	0.082
H6a: PSV	0.047	0.182	0.050	0.356	0.029	0.410	0.068	0.291
H7b: BSI*FORM			-0.231	0.103				
H7d: BSI*CENT			0.139	0.063				
H8b: BSI*FLEX					-0.069	0.256		
H8d: BSI*SOL					-0.113	0.289		
H8f: BSI*INF					-0.079	0.355		
H8h: BSI*RPW					-0.016	0.440		
H10b: CENT*PSV			0.046	0.296				
Dep. var.: **EPE**								
SSI			**0.482**	**0.023**				
BSI			0.031	0.440	0.242	0.065		
H3c: FORM	**0.175**	**0.026**	0.101	0.308				
H3d: CENT	-0.028	0.285	-0.082	0.232				
H4e: FLEX	**-0.106**	**0.040**			-0.103	0.186	-0.138	0.089
H4f: SOL	-0.102	0.096			-0.042	0.418	0.114	0.285
H4g : INF	**0.273**	**0.003**			0.224	0.165	0.309	0.065
H4h : RPW	-0.087	0.062			-0.072	0.280	-0.082	0.234
H5b: AGG	-0.043	0.314	**-0.259**	**0.037**	-0.093	0.280	-0.021	0.448
H6b: PSV	**0.375**	**0.000**	0.210	0.128	**0.360**	**0.003**	**0.379**	**0.003**
H7g: SSI*CENT			-0.028	0.422				
H7h: BSI*CENT			0.111	0.206				
H8n: BSI*INF					-0.232	0.146		
H8p: BSI*RPW					0.050	0.350		
H10d: CENT*PSV			**0.193**	**0.038**				
H12g: INF*PSV							**-0.268**	**0.021**
Dep. var.: **SAT**								
BSI			**0.324**	**0.019**	0.215	0.086		
H3e: FORM	**0.186**	**0.014**	**0.322**	**0.014**				
H3f: CENT	-0.048	0.106	-0.078	0.205				
H4i: FLEX	**0.074**	**0.027**			0.065	0.263	0.054	0.167
H4j: SOL	**0.319**	**0.000**			0.219	0.132	0.314	0.054
H4k: INF	**0.405**	**0.000**			**0.446**	**0.006**	**0.465**	**0.002**
H4l: RPW	-0.063	0.080			-0.076	0.224	-0.066	0.236
H5c: AGG	-0.082	0.121	**-0.319**	**0.002**	-0.128	0.130	-0.075	0.248
H6c: PSV	**0.194**	**0.001**	0.250	0.052	0.173	0.072	**0.202**	**0.050**
H7j: BSI*FORM			-0.249	0.092				
H7l: BSI*CENT			0.100	0.130				
H8r: BSI*FLEX					-0.012	0.451		
H8x: BSI*RPW					0.006	0.480		

Unstandardized parameter estimates of the effects, paths significant at 5% level in bold.
When path coefficients are fixed, one-tailed *P*-value shows 999.0

5.2. Testing the effect of asymmetric-power relationship on TCE

The purpose of this section is to test hypotheses concerning asymmetric-power relationships. Data used in this section are the sub-data from the data used in the Section 5.1 in which respondents identified that they have asymmetric-power relationships with their buyers. The total sample size is 108 cases.

The construct of specific investments is not the same as the construct used in Section 5.1; in this case, it refers to stronger-held specific investments or weaker-held specific investments, depending on the investors.

In Section 5.2.1, the data are analysed for normal distribution. CFA is performed on the measurement model in Section 5.2.2. After the full measurement model is established, the hypotheses are tested in structural models in Section 5.2.3. The final sub-section summarizes the results of the hypothesis testing.

5.2.1. Requirement of multivariate analysis

It is necessary to examine whether the data is normal distributed (see more detail in Section 5.1.1). Most observed variables used in Section 5.2 are predetermined by the final measurement model in Section 5.1. Therefore, items reflecting constructs are not all items acquired during data collection. For example, centralization is measured by CENT1 and CENT2, rather than CENT1 to CENT4. Two measures were conducted based on Hair et al. (1998): graphical examination and non-normality assessing. With regard to missing values analysis (as explained in Section 5.1.1), cases with missing data were excluded before performing the data analysis.

- Graphical examination

Histograms and frequency tables produced by using IBM SPSS 20 provide better understanding of the data. Observed variables that reflect formalization, centralization, solidarity, information exchange, and restraint in the use of power seem to be skewed towards high values on the Likert scale, while observed variables of opportunism and stronger-held specific investments seem to be skewed towards low values.

- Normality assessing

Use of IBM SPSS 20 (see descriptive statistics in Appendix K) shows that no observed variables exhibit the evidence of kurtosis.

The conclusion is that many observed variables seem to be skewed. This may be sufficient to render the distribution as multivariate non-normal. Robust estimators, therefore, will be used for data analysis in Section 5.2.

5.2.2. Measurement models

In this step, the measurement models of stronger-held specific investments and weaker-held specific investments were analyzed (all others were analyzed in Section 5.1). First, the measurement models for these two constructs is analyzed (Section 5.2.2.1). Second, the full measurement model, including the details of the assessments of fits, reliability, and validity, is analyzed in Section 5.2.2.2. Section 5.2.2.3 presents the summary of the measurement model. The structural analysis is detailed in section 5.2.3.

5.2.2.1. The measurement model for weaker-held and stronger-held specific investments

Section 5.2 describes the test for hypotheses concerning the moderating effect of asymmetric power on the relationship between specific investments and governance modes. More specifically, it compares the effects of stronger-held specific investments and weaker-held specific investments on governance modes. It was necessary to ensure that stronger-held specific investments and weaker-held specific investments measure the same construct. To do this, the two variables must be equality constrained, i.e., each factor loading of these two constructs must be equally constrained to its counterpart. For example, STSI1 is equality constrained to WKSI1. However, due to the parsimonious perspective, CFA is necessary to find out which observed variables should be included in the model (rather than including all eight observed variables of specific investments). This analysis follows the same approach as the CFA of one-factor hierarchical governance in Section 5.1.

A run of CFA for each of these two models revealed that stronger-held specific investments had four items with good fit: STSI3 STSI4 STSI5 STSI7, while weaker-held specific investments have WKSI2 WKSI3 WKSI5 WKSI7 (see Table 5.9). Two latent variables have different baseline models. It is not possible to impose equality constraint on them. Therefore, it is necessary to find out which factorial structure between these two models better fits the data; that structure will be the base line measurement model for the construct of weaker-held and stronger-held specific investments.

Table 5.9 CFA of stronger-held and weaker-held specific investments

Constructs	MLM χ^2 (*df*), P-Value	RMSEA estimate, 90% C.I., close-fit test *P*	CFI	TLI	SRMR	Remaining items	Deleted items
Stronger-held specific investments	2.131(2), 0.3446	0.025, 0.000-0.194, 0.438	0.999	0.998	0.017	*STSI3 STSI4 STSI5 STSI7*	*STSI1 STSI6 STSI8 STSI2*
Weaker-held specific investments	2.166(2), 0.3385	0.028, 0.000-0.195, 0.432	0.999	0.996	0.021	*WKSI2 WKSI3 WKSI5 WKSI7*	*WKSI1 WKSI4 WKSI6 WKSI8*

Specific investments is measured by item 3, 4, 5, and 7 (Model A)

The CFA model tested in the application adopted the factorial structure of stronger-held specific investments (see Table 5.9), and hypothesized a priori that (a) stronger-held and weaker-held specific investments are invariant and can be explained by items 3, item 4, item 5, and item 7; (b) each item has a nonzero loading on the construct it was designed to measure, and zero ladings on all other constructs; (c) the two constructs are correlated; and (d) the measurement errors are uncorrelated. A schematic representation of this model is shown in Figure 5.7.

- **Model A1**: The a priori CFA model exhibited reasonable fit (see Table 5.10).
- **Model A2**: Re-specifying the model based on the standardized factor-loading values results in STSI7 having low loading. It was therefore removed, along with its counterpart. The model fit the data perfectly. The model is presented in Figure 5.8.

Table 5.10 CFA of stronger-held and weaker-held specific investments with the equality constrained

Model	MLM χ^2 (*df*), P-Value	RMSEA estimate, 90% C.I., close-fit test *P*	CFI	TLI	SRMR	Remaining items	Deleted items
A1	36.108(22), 0.0296	0.077, 0.025-0.121, 0.158	0.966	0.956	0.067	*STSI3 STSI4 STSI5 STSI7 WKSI3WKSI4 WKSI5 WKSI7*	
A2	3.684(10), 0.9605	0.000, 0.000-0.000, 0.985	1.000	1.029	0.017	*STSI3 STSI4 STSI5 WKSI3WKSI4 WKSI5*	*STSI7 WKSI7*

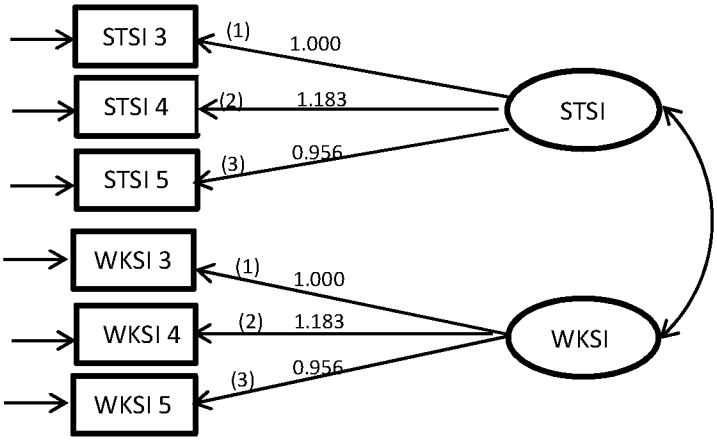

Figure 5.8 Final measurement model of invariant factor between stronger-held specific investments and weaker-held specific investments. Numbers above the paths in parentheses represent each pair of equality constraint. Numbers without parentheses are un-standardized loadings

Specific investments is measured by item 2, 3, 5, and 7 (Model B)

The CFA model tested in the present application adopted the factorial structure of weaker-held specific investments (see Table 5.9), and hypothesized a priori that (a) stronger-held specific investments and weaker-held specific investments are invariant and can be explained by the four indicator variables of item 2, item 3, item 5, and item 7; (b) each item has a nonzero loading on the construct it was designed to measure, and zero ladings on all other constructs; (c) the two constructs are correlated, and (d) the measurement errors are uncorrelated.

- **Model B1**: The a priori CFA model exhibited poor fit, see Table 5.11.
- **Model B2**: Re-specifying the model, based on the model modification indices, results in STSI7 and WKSI7 having correlation between their error variance. They were therefore removed. The model results showed perfect fit.

Table 5.11 CFA of stronger-held and weaker-held specific investments with the equality constrained

Model	MLM χ^2 (*df*), P-Value	RMSEA estimate, 90% C.I., close-fit test *P*	CFI	TLI	SRMR	Remaining items	Deleted items
B1	52.095(22), 0.0003	0.113, 0.073-0.152, 0.007	0.903	0.876	0.086	*STSI2 STSI3 STSI5 STSI7 WKSI2 WKSI3 WKSI5 WKSI7*	
B2	8.675(10), 0.5632	0.000, 0.000-0.094, 0.748	1.000	1.010	0.051	*STSI2 STSI3 STSI5 WKSI2 WKSI3 WKSI5*	*STSI7 WKSI7*

In summary, it is evident that model A2 delivered better fit than model B2 in all indices. Based on these findings, the conclusion is that specific investments are better explained by items 3, 4, and 5, as in model A2. A schematic representation of this model is shown in Figure 5.8.

5.2.2.2. The full measurement model

In this section, the full measurement model is analyzed, following the same approach as the testing of the full measurement model in Section 5.1. The CFA model tested in the present application postulates a priori that:

a. The full measurement model consists of the following constructs: formalization (ξ_1 = FORM), centralization (ξ_2 = CENT), flexibility (ξ_3 = FLEX), solidarity (ξ_4 = SOL), information exchange (ξ_5 = INF), restraint to the use of power (ξ_6 = RPW), stronger-held specific investments (ξ_7 = STSI), weaker-held specific investments (ξ_8 = WKSI), environmental uncertainty (ξ_9 = UNC), and opportunisms (ξ_{10} = OPP).
b. Each item-pair measure has a nonzero loading on the factor that it was designed to measure and zero loading on all other factors.
c. All factor loadings of STSI and WKST are fixed to un-standardized factor loadings acquired from their final measurement models in Section .2.2.1. The rest of the factor loadings are fixed to un-standardized factor loadings acquired from the full measurement model under Section 5.1. This ensures the location of these concepts (Anderson and Gerbing ,1988);
d. All constructs are correlated to acquire the strongest test of measurement model (Jøreskog, 1993).
e. Residual errors associated with each measure are uncorrelated.
f. The covariance matrix of the constructs was unconstrained. Therefore, a lack of fit can be attributed only to the relations among the measures and their error terms.

A one-time run of the CFA model showed good fit: MLM χ^2 (*df*) = 226.058 (221), P-value = 0.3934; CFI = 0.995; TLI =0.994; RMSEA = 0.015 (90% CI: 0.000, 0.043), close-fit test *P* = 0.986; SRMR = 0.053. Therefore, this model was chosen as the final measurement model. It is presented schematically in Figure 5.9.

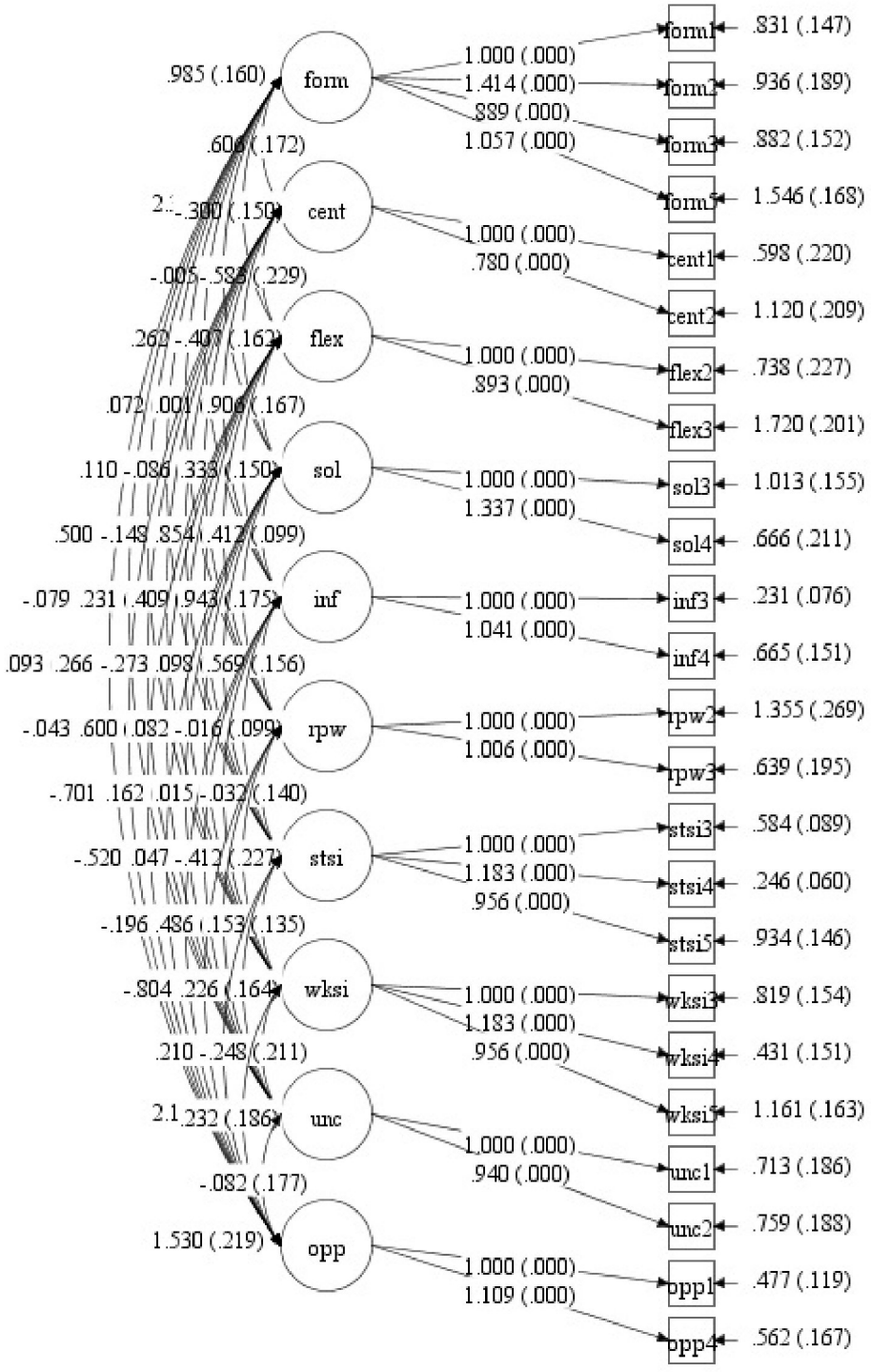

Figure 5.9 The full measurement model, un-standardized estimates

- Reliability

In the previous section, a measurement model was established with good global fit indices. However, the internal fit of the model should be justified (as explained in Section 5.1.2.3). Reliability measures were conducted according to the four evaluation criteria of Bagozzi and Yi (1988). The results of testing the full measurement model are presented in Table 5.12. All measures have significant parameter estimates greater than the 0.6 cut-off. Most individual item reliabilities are high and satisfactory. Composite reliabilities of all constructs are greater than the 0.6 cut-off. All values of average variance extracted are higher than the 0.5 cut-off.

Table 5.12 The full measurement model

Note to the table: (a) called R-SQUARE in the M*plus* 7 output, (b) calculated as the square of the highest correlation of each construct

	Factor loading		**Error term**		**Item reliability (a)**	**Composite reliability**	**Average variance extracted**	**Highest shared variance(b)**
	Standardized estimate	t-values	Standardized estimate	t-values				
Formalization (ξ_1)						0.82	0.53	0.16
FORM1	0.737	18.139	0.457	7.647	0.543			
FORM2	0.823	20.840	0.322	4.948	0.678			
FORM3	0.685	16.747	0.531	9.490	0.469			
FORM5	0.645	17.555	0.584	12.330	0.416			
Centralization (ξ_2)						0.81	0.68	0.16
CENT1	0.892	22.955	0.204	2.934	0.796			
CENT2	0.748	19.985	0.440	7.860	0.560			
Flexibility (ξ_3)						0.76	0.62	0.38
FLEX2	0.862	19.498	0.257	3.373	0.743			
FLEX3	0.705	19.521	0.503	9.877	0.497			
Solidarity (ξ_4)						0.76	0.62	0.43
SOL3	0.709	17.989	0.498	8.905	0.502			
SOL4	0.856	17.887	0.267	3.259	0.733			
Information exchange (ξ_5)						0.81	0.68	0.20
INF3	0.886	26.653	0.215	3.660	0.785			
INF4	0.760	14.887	0.422	5.437	0.578			
Restraint to the use of power (ξ_6)						0.81	0.68	0.43
RPW2	0.772	17.403	0.403	5.884	0.597			
RPW3	0.872	21.464	0.239	3.378	0.761			
Stronger-held specific investments (ξ_7)						0.88	0.72	0.06
STSI3	0.838	31.301	0.298	6.651	0.702			
STSI4	0.942	59.440	0.113	3.797	0.887			
STSI5	0.757	23.218	0.426	8.626	0.574			
Weaker-held specific investments (ξ_8)						0.89	0.72	0.13
WKSI3	0.838	27.922	0.298	5.939	0.702			
WKSI4	0.928	35.381	0.138	2.833	0.862			
WKSI5	0.776	26.540	0.398	8.760	0.602			
Environmental uncertainty (ξ_9)						0.84	0.77	0.08
UNC1	0.865	23.616	0.251	3.958	0.749			
UNC2	0.844	21.979	0.288	4.435	0.712			
Opportunisms (ξ_{10})						0.87	0.77	0.21
OPP1	0.873	29.802	0.238	4.644	0.762			
OPP4	0.878	24.370	0.230	3.638	0.770			

- Validity

This section evaluates the construct validity of the scales, i.e., convergent validity and discriminant validity (see Section 5.1.2.3 for more detail). Table 5.12 shows that all factor-loading estimates are significant, i.e., with t-values above 2.33. Therefore, the conclusion is that convergent validity can be claimed (Anderson and Gerbing, 1988).

Discriminant validity can be tested in two ways. The first is to check correlations among the latent constructs. Table 5.13 presents the correlation estimates between the latent constructs and their standard errors. There were no pairs of latent construct that correlated. High correlation was found between (a) solidarity and restraint to the use of power at 0.659 (with its corresponding confidence interval between 0.510 and 0.808) and (b) flexibility and solidarity at 0.613 (with its corresponding confident interval between 0.454 and 0.772).

The second method, according to Fornell and Larcker (1981), is to check each latent variable to determine whether its average variance extracted is higher than its highest shared variance; if it is, discriminant validity is demonstrated. Average variance extracted was calculated and is presented in Table 5.12. Shared variance is a square of correlations between the latent variables. This highest of each latent variable is also presented in Table 5.13. It is evident that all average variances extracted are greater than the highest shared variance. Therefore, the conclusion is that discriminant validity can be claimed.

Table 5.13 Correlation matrix for the full measurement model. Standard errors in parentheses, insignificant correlations in italics, and the highest correlation for each variable in bold

	FORM	CENT	FLEX	SOL	INF	RPW	STSI	WKSI	UNC	OPP
FORM	1.00									
CENT	**0.399 (0.095)**	1.00								
FLEX	-0.207 (0.096)	-0.261 (0.094)	1.00							
SOL	-0.005 (0.105)	- 0.263 (0.092)	**0.613 (0.081)**	1.00						
INF	0.288 (0.120)	0.001 (0.108)	0.249 (0.107)	**0.444 (0.087)**	1.00					
RPW	0.051 (0.103)	-0.040 (0.099)	0.413 (0.099)	**0.659 (0.076)**	0.438 (0.098)	1.00				
STSI	0.095 (0.092)	-0.083 (0.098)	**0.239 (0.087)**	0.083 (0.097)	-0.015 (0.092)	-0.019 (0.085)	1.00			
WKSI	**0.363 (0.088)**	0.109 (0.095)	-0.135 (0.113)	0.058 (0.099)	0.012 (0.102)	-0.210 (0.113)	0.094 (0.080)	1.00		
UNC	-0.055 (0.102)	0.119 (0.096)	**0.282 (0.118)**	0.110 (0.113)	0.035 (0.117)	0.235 (0.100)	0.132 (0.093)	-0.122 (0.102)	1.00	
OPP	0.076 (0.083)	-0.023 (0.096)	-0.388 (0.105)	-0.416 (0.095)	-0.173 (0.085)	**-0.459 (0.085)**	0.145 (0.085)	0.135 (0.112)	-0.045 (0.098)	1.00

5.2.2.3. Summary and conclusions of the measurement model

The data set used in this part of the hypothesis testing (Section 5.2), is a subset of the entire dataset used in Section 5.1. It consists of 108 observations with a characteristic of asymmetric-power relationships between exchange partners. The requirements for multivariate analysis were considered, using graphical examination, missing value analysis, and non-normality testing. Some observed variables showed skewness in histogram chart, but no items failed the test of zero kurtosis. This may be sufficient to render the distribution as multivariate non-normal. Therefore, robust estimation (MLM estimators), was used.

Establishment of the measurement model was conducted only for the measurement model of specific investments, to determine whether the final factorial structure should follow the pattern of stronger or weaker specific investments. The measurement model with items 3, 4, and 5 better fit the data. The full measurement model gave good fit in all indices. Convergent validity was achieved since all latent variables presented satisfactory composite reliability and average variance extracted, while all factor-loading estimates were significant. Discriminant validity was satisfactory since no pair of any latent constructs is perfectly correlated, and average variance extracted of each latent construct was higher than its shared variance.

5.2.3. Structural analysis

In this section, hypotheses concerning asymmetric-power relationships developed in Chapter 3 are tested. This test constitutes the latter part of the two-step approach of Anderson and Gerbing (1998). SEM was used to analyze the direct effects in the model, with the help of Mplus 7.0.

Testing strategy, model fit, and results

The hypotheses were tested by estimating the model from the observed sample covariance matrix and using the robust maximum likelihood estimator (as explained in Section 5.2.1). Figure 5.10 is used to present the testing strategy of hypothesis 13, instead of Figure 3.3. In that figure, the estimates between stronger-held specific investments and each mode of governance will be compared with estimates of weaker-held specific investments and the same mode of governance.

First, CRA was performed on the measurement model.. The measurement model was different from the full measurement in the previous section (Section 5.2.2) in that it did not include

control variables. The fit indices presented a good fit: MLMχ^2 $_{(154)}$ = 156.682, *P*-value = 0.4247; CFI = 0.997; TLI =0.996; RMSEA = 0.013 (90% CI: 0.000, 0.047), close-fit test *P* = 0.970; SRMR = 0.056.

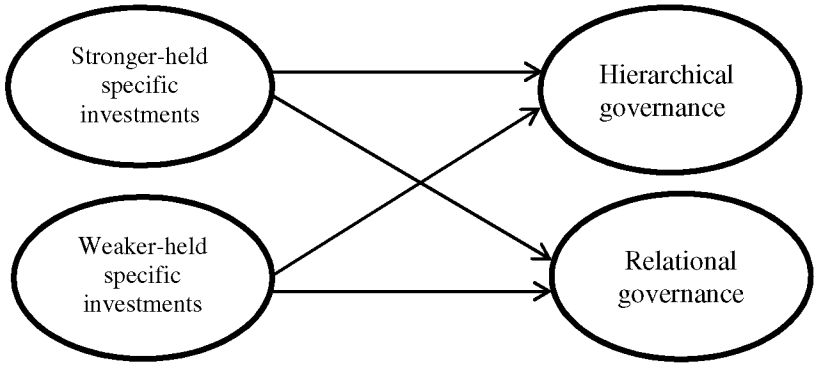

Figure 5.10 The model of asymmetric-power relationships

Next, the structural model was analyzed, with stronger-held specific investments and weaker-held specific investments equality constrained on their factor loading. Results showed that all fit indices were the same as the indices of the measurement model, since both models are saturated and have the same degree of freedom, i.e., the restriction of the equality constraint between stronger-held and weaker-held specific investments and the relations between latent variables did not significantly worsen the fit of the model.

The model results are presented in the Table 5.14. Hypothesis 13a was supported. Weaker-held specific investments have a significant positive effect (0.255, *P* = 0.000), while stronger-held ones show no effect (0.051, *P* =0.253).

Hypothesis 13b was rejected. Neither effect was significant. Weaker-held specific investments have an insignificant positive effect on centralization (0.135, *P* = 0.103), while stronger-held specific investments have an insignificant negative effect (-0.130, *P* = 0.146).

Hypothesis 13c was rejected. Stronger-held specific investments have a significant positive effect on flexibility (0.318, *P* = 0.002), while weaker-held specific investments show a marginally significant negative effect (-0.168, *P* = 0.081).

Hypothesis 13d was rejected. Neither effect was significant. Stronger-held specific investments have an insignificant positive effect on solidarity (0.068, *P* = 0.213), while weaker-held specific investments have an insignificant positive effect to a low degree (0.037, *P* = 0.306).

Hypothesis 13e was rejected. Neither effect was significant. Weaker-held specific investments have an insignificant positive effect (0.009, P =0.449), while stronger-held investments have an insignificant negative effect (-0.013, P =0.428).

Hypothesis 13f was rejected. Stronger-held specific investments have an insignificant negative effect (-0.002, P = 0.494), while weaker-held specific investments have a significant negative effect (-0.211, P = 0.038).

Testing the model with control variables

To account for spurious associations and other competing explanations, control variables are included in the model. The control variables are uncertainty and opportunism. The hypothesized model used is the model of the previous application including (a) the path leading from uncertainty to two dimensions of hierarchical governance and (b) the path leading from opportunism to four dimensions of relational governance. The measurement model was established in Section 5.2.2.2.

A run of the model produced the results presented in Table 5.14. The corrected MLM $\Delta\chi^2_{(73)}$ = 76.32692, P = 0.3721, indicating that the two models are not significantly different. However, the fit indices of the present model are worse than the model in previous application: MLM$\chi^2_{(227)}$ = 232.862, P-value = 0.3806; CFI = 0.995; TLI =0.994; RMSEA = 0.015 (90% CI: 0.000, 0.043), close-fit test P = 0.987; SRMR = 0.058. This increases the confidence in the model in the previous application.

With regard to control variables, it was found that uncertainty has a significant positive effect on centralization, but no effect on formalization. Opportunism has significant negative effects on all four dimensions of relational governance. A comparison of the sizes and significance levels between the two models reveals some slight changes. Most significant effects are still significant after including the control variables. This provides additional support for the original model.

5.2.4. Summary of results

The results of testing the hypothesized model are presented in Figures 5.11 and 5.12. The parameter estimates in the model are based on the parameter estimates obtained from using a robust estimator. Paths that achieved support at the 5% significance level or higher are indicated in black text, while insignificant paths are indicated in grey.

Testing of the effect of asymmetric-power relationship effects on TCE framework showed that the effect of weaker-held specific investments on formalization is greater than the effect of stronger-held specific investments on the same mechanism. Other tests for asymmetric power effect on hierarchical governance were rejected due to no-effects. Moreover, with regard to relational governance, and contrary to expectation, the effect of stronger-held specific investments on flexibility is greater than the effect of weaker-held specific investments on the same relational norm; also, the effect of weaker-held specific investments on restraint to the use of power is negative.

Table 5.14 Test of hypotheses – direct effects in the model pertaining to observations with asymmetric-power relationships including control variables

		Original model		Including control variables	
Structural linkage in the model	**Sign**	**Estimates**	**One - tailed P-value**	**Estimates**	**One - tailed P-value**
Dependent variable: **Formalization**					
H13a: Stronger-held specific investments	+	0.051	0.236	0.051	0.242
H13a: Weaker-held specific investments	+	**0.255**	**0.000**	**0.256**	**0.000**
Uncertainty				0.000	0.499
Dependent variable: **Centralization**					
H13b: Stronger-held specific investments	+	-0.130	0.146	-0.161	0.086
H13b: Weaker-held specific investments	+	0.135	0.103	0.160	0.068
Uncertainty				**0.205**	**0.019**
Dependent variable: **Flexibility**					
H13c: Stronger-held specific investments	+	**0.318**	**0.002**	**0.390**	**0.000**
H13c: Weaker-held specific investments	+	-0.168	0.081	-0.116	0.146
Opportunism				**-0.499**	**0.000**
Dependent variable: **Solidarity**					
H13d: Stronger-held specific investments	+	0.068	0.213	0.121	0.052
H13d: Weaker-held specific investments	+	0.037	0.306	0.076	0.141
Opportunism				**-0.372**	**0.000**
Dependent variable: **Information exchange**					
H13e: Stronger-held specific investments	+	-0.013	0.428	0.007	0.462
H13e: Weaker-held specific investments	+	0.009	0.449	0.023	0.363
Opportunism				**-0.137**	**0.022**
Dependent variable: **Restraint to the use of power**					
H13f: Stronger-held specific investments	+	-0.002	0.494	0.075	0.219
H13f: Weaker-held specific investments	+	**-0.211**	**0.038**	-0.160	0.066
Opportunism				**-0.518**	**0.000**

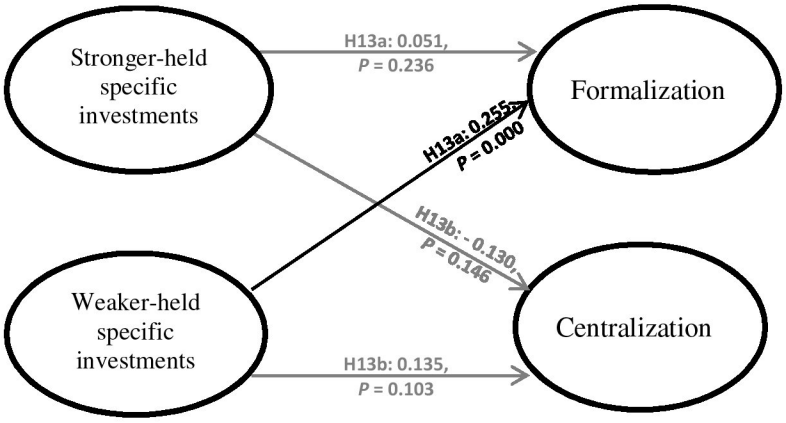

Figure 5.11 Results from testing the hypotheses in asymmetric relationships
Note: Unstandardized parameter estimates of the effects, Black texts and arrows are significant effects, Grey texts and arrows are insignificant effects.

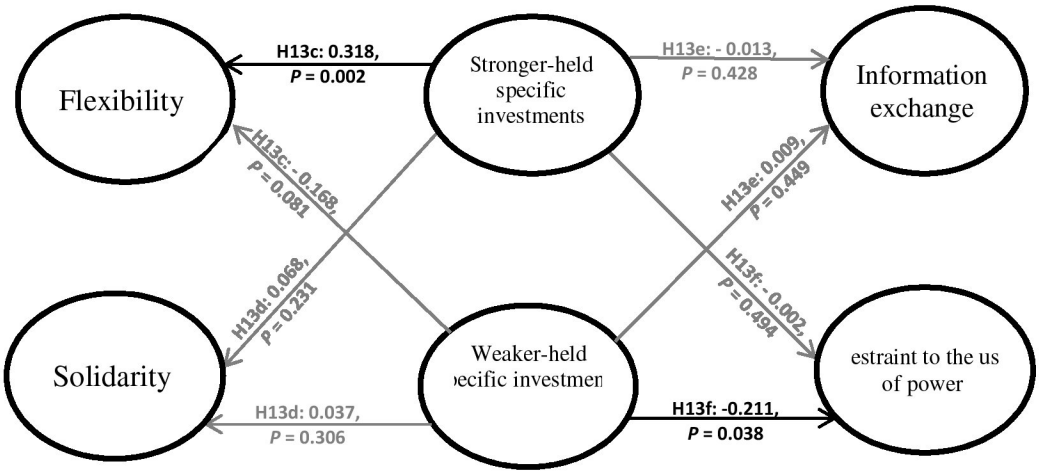

Figure 5.12 Results from testing the hypotheses in asymmetric relationships
Note: Unstandardized parameter estimates of the effects, Black texts and arrows are significant effects, Grey texts and arrows are insignificant effects.

5.3. Testing the asymmetric and symmetric power hypotheses

Section 5.3 tests hypotheses comparing the ability of the TCE framework to explain mode of governance in asymmetric and symmetric-power relationships. A testable model of the effect of power structure on TCE in buyer-supplier relationships is presented in Figure 3.4.

Data used in this section are the same data used in Section 5.1. However, the entire dataset was divided into two groups: asymmetric-power and symmetric-power. In the asymmetric-power group, respondents identified that they have asymmetric-power relationships with their customer. In the symmetric-power group, in contrast, they selected either "Our firm and this customer are equally dependent on each other," or "Our firm is not dependent on this customer, and this customer is not dependent on our firm." The sample size of the asymmetric-power group is 108, while the sample size of the symmetric-power group is 90. The construct of specific investments are supplier-held and buyer-held specific investments.

First, the data were analyzed to determine whether they were normal distributed (Section 5.3.1). Next, the test of measurement invariance was performed (Section 5.3.2). Structural invariance is analyzed in Section 5.3.3. The summary of results is in Section 5.3.4.

5.3.1. Requirement of multivariate analysis

Two measurements are conducted based on Hair et al. (1998): graphical examination and non-normality assessing. With regard to missing values analysis (as explained in Section 5.1.1), there is no missing value in this study. Moreover, although the entire dataset had already been analysed, with the finding that the data are non-normally distributed (see Section 5.1.1), it may be beneficial to analyze the two groups of data (asymmetric-power and symmetric-power) separately.

- Graphical examination

Histograms and frequency tables produced by IBM SPSS 20 provide a better understanding of the data. In the group of asymmetric-power relationships, observed variables reflecting formalization, centralization, and supplier-held specific investments seem to be skewed towards high values on the Likert scale, while observed variables of opportunism and buyer-held specific investments seem to be skewed towards low values. Similarly, for the group of symmetric-power relationships, observed variables reflecting formalization, centralization, and supplier-held specific investments seem to be skewed towards high values on the Likert scale,

while observed variables of opportunism and buyer-held specific investments seem to be skewed towards low values.

- Normality assessing

The descriptive statistics of a group of asymmetric-power and symmetric-power relationships produced by using IBM SPSS 20 are presented in the Appendix L. They show that no observed variables in the both groups exhibit evidence of kurtosis. Nevertheless, many observed variables seem to be skewed. This may be sufficient to render the distribution as multivariate non-normal. Robust estimators, therefore, will be used for data analysis under Section 5.3.

5.3.2. Measurement invariance

The multiple-group analysis is depicted as Figure 5.13. In general, before the structural invariance can be tested, it is necessary to determine whether the observed variables under study measure the same theoretical constructs in both groups, i.e., measurement invariance (Byrne, 2012; Wang and Wang, 2012).

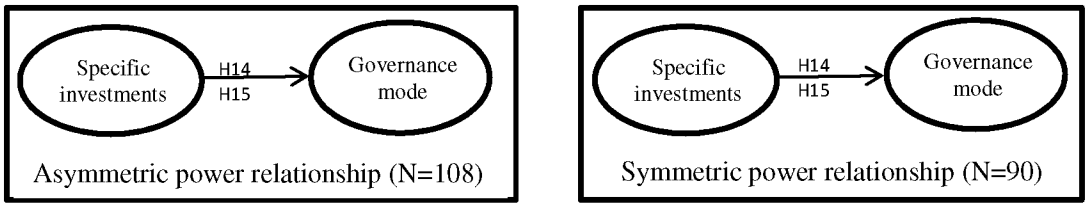

Figure 5.13 Hypothesized model of the impact of power structure on TCE

Testing for measurement invariance includes a cumulative series of steps. It begins with the establishment of a separate baseline model for each group that fits the data from the parsimonious perspective and for meaningfulness. Once the group-specific baseline models have been determined, the test of measurement invariance can be conducted.

In the first step, configural invariance occurs when there is the same number of factors and the same patterns of free and fixed loadings across groups without equality restrictions on any other model parameters. Configural invariance is necessary; if it is not demonstrated, the observed indicators are measuring different constructs in different groups.

In the second step, a weak measurement model, or metric invariance, occurs when factor loadings across groups are invariant. If so, the measures across groups are considered to be on the same scale. When weak measurement is demonstrated, the latent constructs are measured in the same way in all groups. Therefore, further testing invariance of relationships between factors is meaningful.

In the test for measurement and structural invariance, restrictions are imposed on various parameters of interest, across groups. To determine whether the corresponding hypothesis of parameter invariance holds, the model χ^2 statistic of the restricted and unrestricted models must not change significantly. In addition, a change in comparative fit index (CFI) can also be used to evaluate multi-group invariance (Cheung & Rensvold, 2002). If ΔCFI is less than or equal to 0.01 between the nested model, there is no meaningful change in the model fit for testing invariance. But if ΔCFI is greater than 0.01, there is a meaningful change in the model fit-i.e., the invariance is not demonstrated.

In this study, the measurement model for all observations has been established and the factor loadings have been identified in Section 5.1.2.3. Therefore, factor loadings of the measurement model in this section are fixed to the unstandardized factor loadings found in the established measurement model in Section 5.1.2.3. The method used in this study is not exactly the same as the general procedure of testing measurement invariance. The application of the establishment of baseline models and the test for configural invariance will not be conducted. The application will start with the test for weak measurement invariance.

Testing weak measurement invariance

As previously explained, weak measurement invariance is defined as the invariance of factor loading across groups. The null hypothesis of the application is that factor loadings are invariant between the asymmetric-power and symmetric-power samples. In the normal procedure, the LR test is used to test the model difference between the weak measurement invariance model and the configural model. However, in this study there is no configural model. Therefore, the model evaluation of the present application will use common model goodness-of-fit indices and the modification indices.

Running the model shows that the weak CFA model fit the data very well: MLMχ^2 (390) = 391.594, *P*-value = 0.4678; CFI = 0.999; TLI =0.999; RMSEA = 0.006 (90% CI: 0.000, 0.037), close-fit test *P* = 0.998; SRMR = 0.065. This is sufficient to conclude that the weak

measurement invariance is demonstrated, i.e., the relationships between responses to the observed items and their underlying constructs are not significantly different in asymmetric-power and symmetric-power groups. It is meaningful to conduct further tests of structural invariance.

5.3.3. Structural analysis

Hypotheses 14 and 15 predict that the effects of specific investments on governance modes in one group are greater than those on another group.

Testing strategy, model fit, and results

To examine whether the effect of specific investments are more positively related to governance modes in one group than another, it was decided to test for equality or invariance of path coefficients across groups. If the results show that the effect of specific investments behaves differently across groups, the hypotheses can be tested by comparing the size and direction of the effect. To test for the invariance of the effect, two baseline SEM models for asymmetric-power and symmetric-power groups were established.

A run of the baseline model for the asymmetric-power group shows that the model fits the data well (see Table 5.15 and Figure 5.14). For hypothesis 14a, supplier-held specific investments have a significant positive effect on formalization (0.394, $P = 0.000$); however, for hypothesis 14b, buyer-held investments show no effect (-0.087, $P = 0.148$). Similarly, for hypothesis 14c, supplier-held specific investments have a significant positive effect on centralization (0.300, $P = 0.015$), but for hypothesis 14d, buyer-held investments show no effect (-0.235, $P = 0.068$). For hypothesis 15a, supplier-held specific investments have a significant negative effect on flexibility (-0.453, $P = 0.000$), but for hypothesis 15b, buyer-held investments have a significant positive effect (0.501, $P = 0.000$). For hypothesis 15c, supplier-held specific investments (-0.013, $P = 0.444$) show no effect on solidarity and for hypothesis 15d, buyer-held specific investments (0.054, $P = 0.282$) show no effect on solidarity. Similarly, for hypothesis 15e, supplier-held specific investments (-0.010, $P = 0.455$) show no effect on information exchange, and for hypothesis 15f, buyer-held specific investments (-0.002, $P = 0.492$) show no effect on information exchange. For hypothesis 15g, supplier-held specific investments have significant negative effects on restraint to the use of power (-0.301, $P = 0.010$), but for hypothesis 15h, buyer-held investments show no effect (0.133, $P = 0.184$).

A run of the baseline model for symmetric-power group shows that the model also fits the data well (see Table 5.15 and Figure 5.14). For hypothesis 14a, supplier-held specific investments have a significant positive effect on formalization (0.196, $P = 0.028$), but for hypothesis 14b, buyer-held investments show no effect (-0.102, $P = 0.124$). For hypothesis 14c, supplier-held specific investments have no effect on centralization (0.126, $P = 0.218$), but for hypothesis 14d, buyer-held investments have a significant negative effect (-0.453, $P = 0.000$). For hypothesis 15a, supplier-held specific investments (-0.236, $P = 0.056$) show no effect on flexibility and for hypothesis 15b, buyer-held investments (-0.071, $P = 0.304$) show no effect on flexibility. For hypothesis 15c, supplier-held specific investments have a significant negative effect on solidarity (-0.215, $P = 0.044$), but for hypothesis 15d, buyer-held investments have a significant positive effect (0.331, $P = 0.000$). For hypothesis 15e, supplier-held specific investments (0.011, $P = 0.452$) show no effect on information exchange and for hypothesis 15f, buyer-held investments (0.115, $P = 0.062$) show no effect on information exchange. For hypothesis 15g, supplier-held specific investments have a significant negative effect on restraint to the use of power (-0.326, $P = 0.024$), but for hypothesis 15h, buyer-held investments have a significant positive effect (0.366, $P = 0.001$).

It was evident that both baseline SEM models fit the data well. The estimated path coefficients apparently differ between the two models, implying that population membership moderates the causal relationships in the model. A further test for structural invariance will be conducted.

Table 5.15 Results from the baseline SEM models

		Asymmetric-power model (N=108)		**Symmetric-power model** (N=90)	
Structural linkage	**Sign**	**Estimates**	**One-tailed P-value**	**Estimates**	**One-tailed P-value**
Dependent variable: **Formalization**					
H14a: Supplier-held specific investments	+	**0.394**	**0.000**	**0.196**	**0.028**
H14b: Buyer-held specific investments	+	-0.087	0.148	-0.102	0.124
Dependent variable: **Centralization**					
H14c: Supplier-held specific investments	+	**0.300**	**0.015**	0.126	0.218
H14d: Buyer-held specific investments	+	-0.235	0.068	**-0.453**	**0.000**
Dependent variable: **Flexibility**					
H15a: Supplier-held specific investments	+	**-0.453**	**0.000**	-0.236	0.056
H15b: Buyer-held specific investments	+	**0.501**	**0.000**	-0.071	0.304
Dependent variable: **Solidarity**					
H15c: Supplier-held specific investments	+	-0.013	0.444	**-0.215**	**0.044**
H15d: Buyer-held specific investments	+	0.054	0.282	**0.331**	**0.000**
Dependent variable: **Information exchange**					
H15e: Supplier-held specific investments	+	-0.010	0.455	0.011	0.451
H15f: Buyer-held specific investments	+	-0.002	0.492	0.115	0.062
Dependent variable: **Restraint to the use of power**					
H15g: Supplier-held specific investments	+	**-0.301**	**0.010**	**-0.326**	**0.024**
H15h: Buyer-held specific investments	+	0.133	0.184	**0.366**	**0.001**
Goodness-of-fit statistics					
MLM$\chi^2_{(df)}$, *P*-value		197.647$_{(195)}$, 0.4336		194.058$_{(195)}$, 0.5056	
CFI		0.997		1.000	
TLI		0.996		1.002	
RMSEA, (90% CI), close-fit *P*		0.011, (0.000,0.044), 0.985		0.000, (0.000, 0.045), 0.976	
SRMR		0.059		0.071	

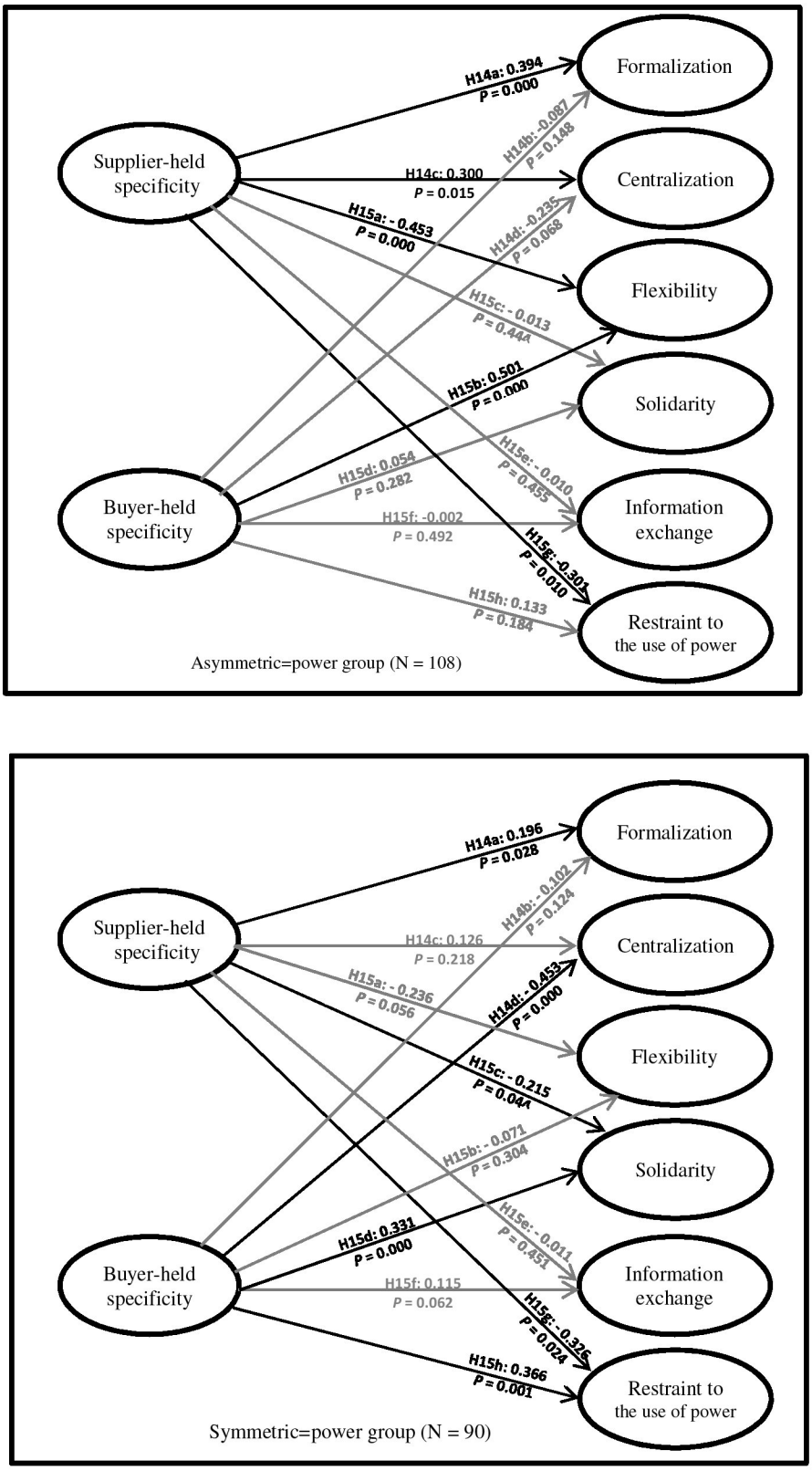

Figure 5.14 Results from testing the hypothesized baseline models of asymmetric-power and symmetric-power groups
Note: Unstandardized parameter estimates of the effects, Black texts and arrows are significant effects, Grey texts and arrows are insignificant effects.

Testing invariance of structural path coefficients across groups

This section tests the structural path coefficient invariance. The non-significant effects in both groups are apparently invariant, since they are not different from zero in both groups; therefore, hypotheses 14b, 15e, and 15f were not included in the test. The focus is on tests of hypotheses 14a, 14c, 14d, 15a, 15b, 15c, 15d, 15g, and 15h.

The SEM model tested in the application postulates a priori that item intercepts and factor loadings were restricted invariant across group. These restrictions (a) ensure that the mean structure part of the model identifiable and (b) enable comparison of the relationships between latent variables and covariates by ensuring the same metric for the latent variables across groups. Samples from asymmetric-power and symmetric-power groups were used simultaneously in the model.

In Mplus, the command MODEL TEST is used to test a variety of specific null hypotheses, including testing many hypotheses simultaneously (Wang and Wang, 2012). Therefore, the application used the MODEL TEST command to test equality of the direct effects.

A run of the hypothesized model that was specified to test the structural path invariance for all nine previously mentioned path coefficients shows that the model fit the data well (see Table 5.16). Mplus also provided a Wald test ($\chi^2 = 26.221$, $df = 9$, $P = 0.0019$), indicating that all null hypotheses can be rejected. The conclusion is that the nine testing effects behave differently in asymmetric-power and symmetric-power groups. As population membership significantly moderates these effects, further comparison will be conducted.

Hypothesis 14a was supported (see Table 5.16). Supplier-held specific investments are more positively related to formalization in an asymmetric-power relationship (0.394, $P = 0.000$) than in a symmetric-power relationship (0.194, $P = 0.029$). Hypothesis 14b was rejected. Effects of buyer-held specific investments on formalization do not vary between two groups. Hypothesis 14c was supported. Supplier-held specific investments are more positively related to centralization in an asymmetric-power relationship (0.301, $P = 0.015$) than in a symmetric-power relationship (0.125, $P = 0.219$). Hypothesis 14d was rejected. Effects of buyer-held specific investments are negatively related to centralization in both groups. Thus, hypothesis 14 is partially supported.

Table 5.16 Results from the multi-group SEM models

		Asymmetric-power model (N=108)		**Symmetric-power model** (N=90)	
Structural linkage	**Sign**	**Estimates**	**One-tailed P-value**	**Estimates**	**One-tailed P-value**
Dependent variable: **Formalization**					
H14a: Supplier-held specific investments	+	**0.394**	**0.000**	**0.194**	**0.029**
H14b: Buyer-held specific investments	+	-0.088	0.147	-0.102	0.125
Dependent variable: **Centralization**					
H14c: Supplier-held specific investments	+	**0.301**	**0.015**	0.125	0.219
H14d: Buyer-held specific investments	+	-0.236	0.068	**-0.453**	**0.000**
Dependent variable: **Flexibility**					
H15a: Supplier-held specific investments	+	**-0.453**	**0.000**	-0.236	0.056
H15b: Buyer-held specific investments	+	**0.502**	**0.000**	-0.071	0.304
Dependent variable: **Solidarity**					
H15c: Supplier-held specific investments	+	-0.013	0.445	**-0.216**	**0.043**
H15d: Buyer-held specific investments	+	0.055	0.281	**0.332**	**0.000**
Dependent variable: **Information exchange**					
H15e: Supplier-held specific investments	+	-0.010	0.455	0.011	0.453
H15f: Buyer-held specific investments	+	-0.002	0.492	0.115	0.061
Dependent variable: **Restraint to the use of power**					
H15g: Supplier-held specific investments	+	**-0.301**	**0.010**	**-0.327**	**0.024**
H15h: Buyer-held specific investments	+	0.134	0.183	**0.366**	**0.001**
MLM$\chi^2_{(404)}$ = 408.917, *P*-value = 0.4224; CFI = 0.997; TLI =0.996; RMSEA = 0.011 (90% CI: 0.000, 0.038), close-fit test *P* = 0.998; SRMR = 0.066 Unstandardized parameter estimates of the effects, paths significant at 5% level in bold.					

Hypothesis 15a was rejected. Effects of supplier-held specific investments are negatively related to flexibility in both groups. Hypothesis 15b was rejected. Buyer-held specific investments are not more positively related to flexibility in a symmetric-power relationship (-0.071, *P* = 0.304) than in an asymmetric-power relationship (0.502, *P* = 0.000). Hypothesis 15c was rejected. Effects of supplier-held specific investments are negatively related to solidarity in both groups. Hypothesis 15d was supported. Buyer-held specific investments are more positively related to solidarity in a symmetric-power relationship (0.332, *P* = 0.000) than in an asymmetric-power relationship (0.055, *P* = 0.281). Hypothesis 15e was rejected. Supplier-held specific investments have no effect on information exchange in both groups. Hypothesis 15f was rejected. Similarly, buyer-held specific investments have no effect on information exchange. Hypothesis 15g was rejected. Effects of supplier-held specific investments are negative in both groups. Hypothesis 15h was supported. Buyer-held specific investments are more positively related to restraint to the use of power in a symmetric-power

relationship (0.366, $P = 0.001$) than in an asymmetric-power relationship (0.134, $P = 0.183$). Thus, hypothesis 15 is partially supported.

Testing the model with control variables

To account for spurious associations and other competing explanations, the control variables of uncertainty and opportunism are included in the model. The hypothesized model is the model in the previous application, including (a) the path leading from uncertainty to two dimensions of hierarchical governance, (b) the path leading from opportunism to four dimensions of relational governance. These additional paths also being tested for structural invariance. The measurement model was established in Section 5.2.2.2.

A run of the hypothesized model that was specified to test the structural path invariance for all previously mentioned fifteen mentioned path coefficients shows that the model fit the data well (see Table 5.17). Mplus also provided a Wald test ($\chi^2 = 50.893$, $df = 15$, $P = 0.0000$), indicating that all null hypotheses can be rejected. The conclusion is that although control variables were included in the model, the testing effects behave differently in asymmetric-power and symmetric-power groups. Population membership significantly moderates these effects. This increases the confidence in the model in the previous application.

With regard to control variables, the finding is that in asymmetric-power relationships, uncertainty has a significant positive effect on centralization, but no effect on formalization. Opportunism has significant negative effects on all four dimensions of relational governance. Comparing the sizes and significance levels between the original model and the model with control variables reveals some slight changes. Most significant effects are still significant. This provides additional support for the original model. Similarly, in symmetric-power relationships, uncertainty has a significant positive effect on centralization, but no effect on formalization. Opportunism has a significant negative effect on information exchange, but no effects on flexibility, solidarity, and restraint to the use of power. Comparing the sizes and significance levels between the original model and the model with control variables reveals some slight changes. Most significant effects are still. This provides additional support for the original model.

5.3.4. Summary of results

Section 5.3 focuses on hypotheses involving multi-group comparison, in which the central concern is whether the specific investments are more positively related to mode of governance

in one relationship than in another relationship, in asymmetric-power and symmetric-power groups. The results from the test for weak measurement invariance showed that the latent variables are measured in the same way, with the same metric in the two groups. Further examination of structural invariance focusing on the significant effect of specific investments on governance modes shows that population membership in asymmetric-power and symmetric-power relationships significantly moderates the effect of specific investments on governance modes. The next examination was to compare the size of the testing effect across groups. It was found that supplier-held specific investments are more positively related to hierarchical governance in asymmetric-power relationships than in symmetric-power relationships, while buyer-held specific investments show no effect or significant negative effect on hierarchical governance. Regarding relational governance, buyer-held specific investments are more positively related to solidarity and restraint to the use of power in symmetric-power relationships than in asymmetric-power relationship. In contrast, buyer-held specific investments are more positively related to flexibility in asymmetric-power relationships than in symmetric-power relationships.

Table 5.17 Results from the multi-group SEM models, including control predictors

		Asymmetric-power model (N=108)		**Symmetric-power model** (N=90)	
Structural linkage	**Sign**	**Estimates**	**One-tailed P-value**	**Estimates**	**One-tailed P-value**
Dependent variable: **Formalization**					
H14a: Supplier-held specific investments	+	**0.402**	**0.000**	**0.201**	**0.020**
H14b: Buyer-held specific investments	+	-0.092	0.139	-0.118	0.096
Uncertainty	-	0.022	0.348	0.041	0.276
Dependent variable: **Centralization**					
H14c: Supplier-held specific investments	+	**0.348**	**0.006**	0.154	0.146
H14d: Buyer-held specific investments	+	**-0.275**	**0.043**	**-0.560**	**0.000**
Uncertainty	-	**0.194**	**0.024**	**0.334**	**0.001**
Dependent variable: **Flexibility**					
H15a: Supplier-held specific investments	+	**-0.361**	**0.004**	-0.236	0.102
H15b: Buyer-held specific investments	+	**0.573**	**0.000**	-0.062	0.324
Opportunism	-	**-0.486**	**0.000**	-0.004	0.494
Dependent variable: **Solidarity**					
H15c: Supplier-held specific investments	+	0.071	0.233	**-0.158**	0.124
H15d: Buyer-held specific investments	+	0.107	0.122	**0.309**	**0.000**
Opportunism	-	**-0.406**	**0.000**	**-0.172**	0.109
Dependent variable: **Information exchange**					
H15e: Supplier-held specific investments	+	0.021	0.411	0.146	0.065
H15f: Buyer-held specific investments	+	0.016	0.426	0.060	0.182
Opportunism	-	**-0.144**	**0.015**	**-0.379**	**0.011**
Dependent variable: **Restraint to the use of power**					
H15g: Supplier-held specific investments	+	-0.198	0.060	**-0.356**	**0.042**
H15h: Buyer-held specific investments	+	0.211	0.078	**0.384**	**0.001**
Opportunism	-	**-0.533**	**0.000**	0.084	0.348
MLM$\chi^2_{(566)}$ = 580.386, *P*-value = 0.3286; CFI = 0.992; TLI =0.991; RMSEA = 0.016 (90% CI: 0.000, 0.037), close-fit test *P* = 0.999; SRMR = 0.067 Unstandardized parameter estimates of the effects, paths significant at 5% level in bold.					

5.4. Testing the symmetric power hypotheses

Section 5.4 tests hypotheses concerning the ability of the TCE framework to explain firms in symmetric-power relationships. In symmetric-power relationships there are two types of relationships: mutual dependence and no-interdependence. As explained in Chapter 3, it is more likely that firms with mutual dependence would employ governance modes at different degrees than firms with no-interdependence. It is therefore of interest to examine whether the structural regression paths between the constructs in the TCE framework differ in the two symmetric-power groups. The model is schematically presented in Figure 5.15.

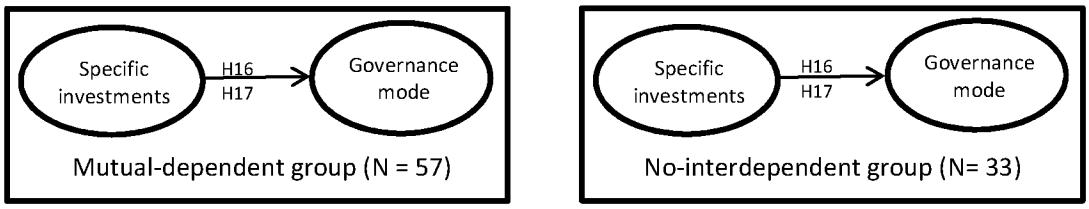

Figure 5.15 Hypothesized multi-group model of TCE framework

Data used in this section are drawn from the sub-data of the data used in Section 5.1 and 5.3 and from respondents who identify that they have either mutual-dependent or no-interdependent relationships with their customer firms. The sample size for the mutual-dependence group is 57; and for the no-interdependence group is 33, for a total of 90.

First, the data were analyzed to determine whether they were multivariate normal distributed (Section 5.4.1). Next, the test of measurement invariance was performed (Section 5.4.2). Structural analysis is presented in Section 5.4.3. The summary of results is presented in Section 5.4.4.

5.4.1. Requirement of multivariate analysis

Two measurements are made based on Hair et al. (1998): graphical examination and non-normality assessing. With regard to missing values analysis, as explained in Section 5.1.1, there is no missing value in this study.

It is noteworthy that although the entire dataset was already analyzed, with the finding that the data are non-normally distributed (see Section 5.1.1), it may be beneficial to separate the data analysis of the mutual-dependent and no-interdependent groups.

- Graphical examination

Histograms and frequency tables produced by IBM SPSS 20 provide a better understanding of the data. In the no-interdependence group, observed variables reflecting formalization, solidarity, information exchange, and restraint to the use of power seem to be skewed towards high values on the Likert scale, while observed variables of opportunism and buyer-held specific investments seem to be skewed towards low values. In the mutual-dependence group, observed variables reflecting formalization, flexibility, solidarity, information exchange, and restraint to the use of power seemed to be skewed towards high values on the Likert scale, while observed variables of opportunism and buyer-held specific investments seem to be skewed towards low values. To make precise decisions about which variables should be excluded from the measurement model, statistical tests were conducted; they are detailed in the following sub-section.

- Normality assessing

The descriptive statistics of a group of mutual-dependent and no-interdependent relationships produced by using IBM SPSS 20 is presented in Appendix M. They show that two observed variables in the group of mutual-dependence exhibit the evidence of kurtosis: INF3 and INF4, while in another group five observed variables exhibit evidence of kurtosis: INF3, INF4, BSI1, BSI8, and OPP4. This presence of kurtotic variables is likely to be sufficient to render the distribution as multivariate nonnormal, which violates the underlying assumption of normality.

Violation of assumption of normal distribution associated with the most common estimator (such as maximum likelihood) can invalidate statistical hypothesis testing. Therefore, analysis in Section 5.4 will use robust estimators.

5.4.2. Measurement invariance

Before testing for structural invariance, it must be determined whether the observed variables under study measure the same theoretical constructs in both groups, i.e., measurement invariance (Byrne, 2012; Wang & Wang, 2012).

As in Section 5.3, the application of the establishment of baseline models and the test for configural invariance will not be conducted. The application will start with the test for weak measurement invariance.

Testing weak measurement invariance

As explained in Section 5.3.2, weak measurement invariance is defined as invariance of factor loading across group. The null hypothesis of the present application is that factor loadings are invariant between the mutual-dependent and no-interdependent samples.

A run of the model showed that the weak CFA model fit the data poorly: MLMχ^2 $_{(390)}$ = 578.903, *P*-value = 0.0000; CFI = 0.800; TLI =0.763; RMSEA = 0.104 (90% CI: 0.086, 0.121), close-fit test *P* = 0.000; SRMR = 0.115. In addition, residual variance of CENT1 and RPW3 in no-interdependence group has negative values.

Model 2 was modified by fixing the residual variance of CENT1 and RPW3. However, the model result still showed that the model fit the data poorly: MLMχ^2 $_{(392)}$ = 581.481, *P*-value = 0.0000; CFI = 0.799; TLI =0.763; RMSEA = 0.104 (90% CI: 0.085, 0.121), close-fit test *P* = 0.000; SRMR = 0.112.

Since the sample sizes of the groups are very small, the decision was made to split the model into two sub-models to reduce the number of free parameters in the model, resulting in (a) a model of specific investment and hierarchical governance, i.e., Hypothesis 16; and (b) a model of specific investments and relational governance, i.e., Hypothesis 17.

Testing weak measurement invariance for the Hypothesis-16 model

The application hypothesizes that factor loadings are invariant across mutual-dependence and no-interdependence groups. A run of the model showed that the weak CFA H16-model fit the data reasonably: MLMχ^2 $_{(162)}$ = 182.718, *P*-value = 0.1267; CFI = 0.955; TLI =0.949; RMSEA = 0.053 (90% CI: 0.000, 0.089), close-fit test *P* = 0.436; SRMR = 0.114. In addition, residual variance of CENT1 in no-interdependence group has negative values.

After the model was modified by fixing the residual variance of CENT1 to zero, the weak CFA H16-model2 fits the data slightly better: MLMχ^2 $_{(163)}$ = 183.207, *P*-value = 0.1330; CFI = 0.956; TLI =0.951; RMSEA = 0.052 (90% CI: 0.000, 0.089), close-fit test *P* = 0.448; SRMR = 0.114.

The goodness-of-fit statistics show that the model fit the data reasonably. It should be enough evidence to demonstrate weak measurement invariance. The conclusion is that the null hypothesis of weak measurement invariance was supported. Therefore, the relationships between responses to the observed items and their underlying constructs are not significantly different in mutual-dependent and no-interdependent groups. It is meaningful to conduct a further test of structural invariance.

Testing weak measurement invariance for the Hypothesis-17 model

The present application hypothesizes that factor loadings are invariant across mutual-dependence and no-interdependence groups. A run of the model showed that the weak CFA H17-model fit the data to a moderate degree: MLM$\chi^2_{(198)}$ = 275.171, *P*-value = 0.0002; CFI = 0.866; TLI =0.837; RMSEA = 0.093 (90% CI: 0.065, 0.118), close-fit test *P* = 0.010; SRMR = 0.103. In addition, residual variance of RPW3 in no-interdependence group has negative values.

After the model was modified by fixing the residual variance of RPW3 to zero, the weak CFA H17-model 2 fit the data slightly better: MLM$\chi^2_{(199)}$ = 276.864, *P*-value = 0.0002; CFI = 0.864; TLI =0.837; RMSEA = 0.093 (90% CI: 0.065, 0.118), close-fit test *P* = 0.009; SRMR = 0.103.

The goodness-of-fit statistics show that the model fit the data to a mediocre degree, providing insufficient evidence that the weak measurement invariance was demonstrated. Therefore, the conclusion is that the null hypothesis of weak measurement invariance was rejected. Consequently, Hypothesis 17 could not be tested.

5.4.3. Structural analysis

The purpose of this section is to test whether the effect of specific investments on hierarchical governance is greater in the no-interdependent relationship than in the mutual-dependent relationship.

Testing strategy, model fit, and results

The first step in comparing the size of the effect was to establish baseline SEM models for mutual-dependence and no-interdependence. If the baseline models fit the data well, the second step is the test of whether the effect of specific investments on hierarchical governance remains unchanged across groups, controlling for covariates. If the testing effect behaves differently across groups, the testing effects can be compared across groups.

A run of the baseline model for mutual-dependent group showed that the model fits the data very well (see Table 5.18 and Figure 5.16): For Hypothesis 16b, buyer-held specific investments have a significant negative effect on formalization (-0.231, P = 0.017), but for Hypothesis 16a, supplier-held investments show no effect (0.106, *P* = 0.184). Similarly, for Hypothesis 16d, buyer-held specific investments have a significant negative effect on

centralization (-0.305, *P* = 0.007), but supplier-held investments show no effect (-0.032, *P* = 0.444).

The no-interdependence model fits the data to a mediocre degree. Model modification indices show no suggestions (see Table 5.18 and Figure 5.16). For Hypotheses 16a and 16c, supplier-held specific investments have significant positive effects on both formalization (0.258, *P* = 0.022) and centralization (0.435, P = 0.045), while for Hypotheses 16b and 16d, buyer-held investments show no effect on formalization (0.157, P = 0.144) and have a significant negative effect on centralization (-1.119, *P* = 0.000).

Table 5.18 Results from the baseline SEM H16-models for mutual-dependence and no-interdependence groups

		Mut.-dep. model (N=57)		**No-interdep. model** (N=33)	
Structural linkage	**Sign**	**Estimates**	**One-tailed P-value**	**Estimates**	**One-tailed P-value**
Dependent variable: **Formalization**					
H16a: Supplier-held specific investments	+	0.106	0.184	**0.258**	**0.022**
H16b: Buyer-held specific investments	+	**-0.231**	**0.017**	0.157	0.144
Dependent variable: **Centralization**					
H16c: Supplier-held specific investments	+	-0.032	0.444	**0.435**	**0.045**
H16d: Buyer-held specific investments	+	**-0.305**	**0.007**	**-1.119**	**0.000**
Goodness-of-fit statistics					
MLMχ^2 (df), *P*-value		81.151(81), 0.4744		103.301(82), 0.0560	
CFI		0.999		0.895	
TLI		0.999		0.884	
RMSEA, (90% CI), close-fit *P*		0.006, (0.000,0.074), 0.780		0.089, (0.000, 0.138), 0.147	
SRMR		0.097		0.138	

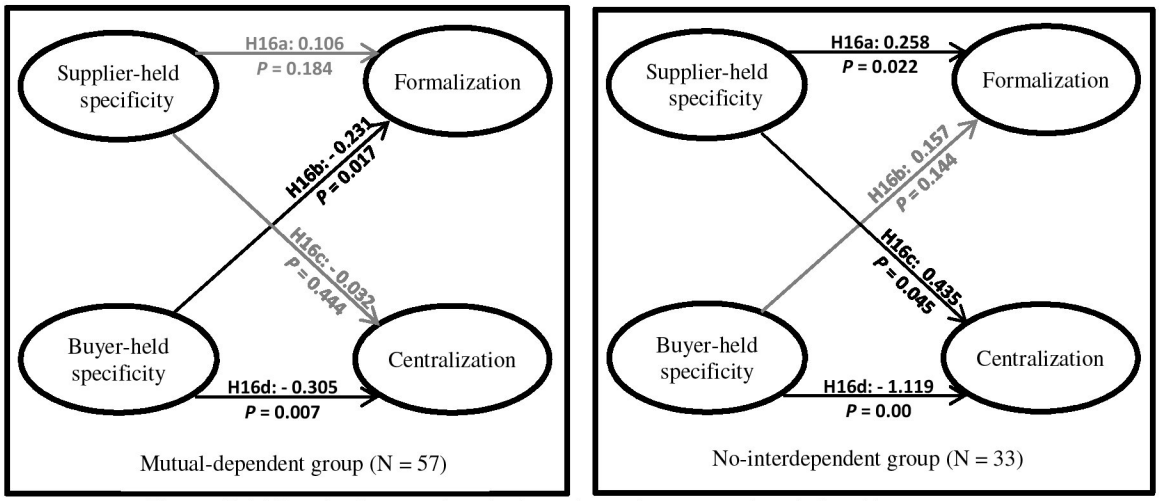

Figure 5.16 Results from testing the hypotheses in symmetric relationships
Note: Unstandardized parameter estimates of the effects, Black texts and arrows are significant effects, Grey texts and arrows are insignificant effects.

It is evident that the mutual-dependence baseline SEM model fits the data well, while the no-interdependence model fits to a mediocre degree. The estimated path coefficients apparently differ in the two models, implying that population membership moderates the causal relationships in the model. The test for structural invariance is conducted in the next application.

Testing invariance of structural path coefficients across groups

The purpose of the application is to test structural path coefficient invariance. The SEM model tested in the application postulates a priori that item intercepts and factor loadings were restricted invariant across group. These restrictions (a) ensure that the mean structure part of the model identifiable and (b) enable us to compare the relationships between latent variables and covariates by ensuring the same metric for the latent variables across groups. Samples from mutual-dependence and no-interdependence groups were used simultaneously in the same model.

As with the test in Section 5.3.3, the Mplus MODEL TEST command is used to test the equality of the direct effects. A run of the hypothesized model that was specified to test the structural path invariance for all path coefficients showed that the model fit the data to a reasonable degree (see Table 5.19). Mplus also provided a Wald test ($\chi^2 = 17.700$, $df = 4$, $P = 0.0014$), indicating all effects behave differently between mutual-dependence and no-interdependence groups. Population membership significantly moderates these effects. The further comparison will be conducted.

Hypothesis 16 is partially supported (see Table 5.19). Hypothesis 16a was supported. Supplier-held specific investments are more positively related to formalization in a no-interdependent relationship (0.258, P = 0.022) than in a mutual-dependent relationship (0.106, P = 0.184). Hypothesis 16b was rejected. Buyer-held specific investments have no effect on formalization in a no-interdependent relationship and have a significantly negative effect in a mutual-dependent relationship. Hypothesis 16c was supported. Supplier-held specific investments are more positively related to centralization in a no-interdependent relationship than in a mutual-dependent relationship. Hypothesis 16d was rejected. Buyer-held specific investments have significant negative effects in both a no-interdependent relationship (-1.119, P = 0.000) and a mutual-dependent relationship (-0.305, P = 0.007).

Table 5.19 Results from the test for structural invariance of SEM H16-models for mutual-dependence and no-interdependence groups

		Mut.-dep. model (N=57)		**No-interdep. model** (N=33)	
Structural linkage	**Sign**	**Estimates**	**One-tailed P-value**	**Estimates**	**One-tailed P-value**
Dependent variable: **Formalization**					
H16a: Supplier-held specific investments	+	0.106	0.184	**0.258**	**0.022**
H16b: Buyer-held specific investments	+	**-0.231**	**0.017**	0.157	0.144
Dependent variable: **Centralization**					
H16c: Supplier-held specific investments	+	-0.032	0.444	**0.435**	**0.045**
H16d: Buyer-held specific investments	+	**-0.305**	**0.007**	**-1.119**	**0.000**
MLMχ^2 $_{(173)}$ = 199.443, *P*-value = 0.0822; CFI = 0.942; TLI =0.939; RMSEA = 0.058 (90% CI: 0.000, 0.092), close-fit test *P* = 0.356; SRMR = 0.118 Unstandardized parameter estimates of the effects, paths significant at 5% level in bold.					

Testing the model with control variables

To account for spurious associations and other competing explanations, the control variable of uncertainty is included in the model. The hypothesized model is the model used in the previous application including (a) the path leading from uncertainty to two dimensions of hierarchical governance and (b) theses additional paths also tested for structural invariance. The measurement model was established in Section 5.2.2.2.

A run of the hypothesized model that was specified to test the structural path invariance showed that the model fit the data well (see Table 5.20). Mplus provided a Wald test (χ^2 = 17.396, *df* = 6, *P* = 0.0079), indicating that although the control variable was included in the model, the testing effects behave differently in mutual-dependence and no-interdependence groups. This increases the confidence in the model used in the previous application.

With regard to the control variable, the findings show that in a mutual-dependent relationship, uncertainty has no effects on centralization or formalization. Comparing the sizes and significance levels of the original model and the model with the control variable reveals some slight changes. Most significant effects are still significant. This provides additional support to the original model. Similarly, in a no-interdependent relationship, uncertainty has a significant positive effect on centralization, but no effect on formalization. Comparing the sizes and significance levels of the original model and the model with control variable reveals some slight changes. Most significant effects are still significant. This provides additional support to the original model.

Table 5.20 Results from the test for structural invariance of SEM H16-models for mutual-dependence and no-interdependence groups with control variables

		Mut.-dep. model (N=57)		**No-interdep. model** (N=33)	
Structural linkage	**Sign**	**Estimates**	**One-tailed P-value**	**Estimates**	**One-tailed P-value**
Dependent variable: **Formalization**					
H16a: Supplier-held specific investments	+	0.110	0.164	**0.228**	**0.030**
H16b: Buyer-held specific investments	+	**-0.241**	**0.016**	0.186	0.102
Uncertainty	+	0.020	0.421	0.085	0.174
Dependent variable: **Centralization**					
H16c: Supplier-held specific investments	+	-0.020	0.465	0.375	0.054
H16d: Buyer-held specific investments	+	**-0.372**	**0.002**	**-1.033**	**0.000**
Uncertainty	+	0.142	0.159	**0.379**	**0.002**
MLMχ^2 $_{(222)}$ = 266.521, *P*-value = 0.0218; CFI = 0.923; TLI =0.917; RMSEA = 0.067 (90% CI: 0.028, 0.095), close-fit test *P* = 0.198; SRMR = 0.112 Unstandardized parameter estimates of the effects, paths significant at 5% level in bold.					

5.4.4. Summary of results

Section of 5.4 focuses on hypotheses involving multi-group comparisons in which the central concern is whether specific investments are more positively related to mode of governance in one relationship than in another relationship (with regard to mutual-dependent and no-interdependent groups). The results from the test for weak measurement invariance showed the model does not fit the data when all the effects from hypotheses 16 and 17 were included. This may have been due to the small sample size. The model was therefore divided into two models to reduce the number of free parameters.

For the model used to test hypothesis 16, the results showed that the latent variables are measured in the same way with the same metric, for the two groups. However, in the model used to test hypothesis 17, the results provided insufficient evident for weak measurement invariance. Therefore, the first conclusion was that hypothesis 17 could not be tested due to lack of weak measurement invariance. Further examination of structural invariance was conducted only for hypothesis 16; the focus was on the effects of supplier-held and buyer-held specific investments on formalization and centralization. The results showed that those effects are not invariance, i.e., population membership between mutual-dependent and no-interdependent relationship significantly moderates the effect of specific investments on hierarchical governance. A further comparison shows that supplier-held specific investments are more positively related to hierarchical governance in a no-interdependent relationship than in a mutual-dependent relationship.

6. Results

This chapter provides a summary and explanation of the results. Section 6.1 presents the results from the test of the core prediction of TCE. Section 6.2 presents the relationship between governance modes and negotiation strategies. Section 6.3 presents the results from the test for the impact of power structure on TCE. Section 6.4 provides a summary of the main findings.

6.1. Testing for the core prediction of TCE

Section 6.1 focuses on the core prediction of TCE. Sections 6.1.1 and 6.1.4 present results from the test for antecedents of governance modes. Sections 6.1.2, 6.1.3, 6.1.5, and 6.1.6 present results from the test for alignment of specific investments and governance modes.

6.1.1. Relationship of specific investments and hierarchical governance

The relationship between specific investments and hierarchical governance was hypothesized to be positive. A model was tested in which two dimensions of hierarchical governance were caused by both supplier-held and buyer-held specific investments, according to hypotheses 1a, 1b, 1c and 1d. The empirical testing found that these four hypotheses were partially supported in both direct-effect model (sub-model 1) and direct and interaction effect model (sub-model 3). Supplier-held specific investments have significant positive effects on formalization and centralization in both sub-models. However, in contradiction to the expectation, buyer-held specific investments have a significant negative effect on formalization in sub-model 3 and have a weakly significantly negative effect on formalization in sub-model 1. Similarly, buyer-held specific investments have significant negative effect on centralization in both sub-model1 and 3.

A number of issues may have caused the significant negative associations between buyer-held specific investments and the two dimensions of hierarchical governance. It may be that there were unobserved variables not examined in this model, causing the negative-associations and no-associations. A possible variable is power structure, which is a characteristic of the sample. Buying firms in this study are oil firms that are usually big, and have power over their supplier firms. Further investigation of asymmetric power was conducted; as expected, the empirical findings suggest that TCE cannot explain how stronger firms choose their governance mode (for further explanation, see Section 6.3).

6.1.2. Relationship of hierarchical governance and relationship performance

A model was tested in which two dimensions of hierarchical governance have direct effects on three dimensions of relationship performance. Results showed that formalization has significant positive effects on all three dimensions of relationship performance. However, contrary to expectation, centralization has no effect on any of them.

6.1.3. Alignment of specific investments and hierarchical governance

The model (sub-model 3) included both the direct effects and interaction effects of supplier-held specific investments, buyer-held specific investments, formalization, and centralization on all three dimensions of relationship performance. However, not all interactions were included due to model complexity beyond the capability of Mplus. Only the significant interactions found in preliminary tests were included.

With regard to the direct effects of specific investments on both dimensions of hierarchical governance, the empirical testing found that the hypotheses were partially supported. Supplier-held specific investments have significant positive effects on both dimensions of hierarchical governance, but buyer-held specific investments have significant negative effects. It is noteworthy that after including interaction effects, the effect of buyer-held specific investment on formalization became significant in a negative direction, found to be weakly significant in the direct effect model (sub-model 1), as detailed in Section 6.1.1.

With regard to direct effect of hierarchical governance on relationship performance, the empirical testing found that the hypotheses were partially supported. Formalization has significant positive effects on cost reduction outcomes and satisfaction with the collaboration, but no effect on end-product enhancement. Centralization has no effect on relationship performance. These results are similar to results from sub-model 1; however, in sub-model 1, formalization has a significant positive effect on end-product enhancement outcomes, but in sub-model 3 it has no effect after the interaction effects were included in the model.

With regard to the interaction effects of specific investments and two dimensions of hierarchical governance on relationship performance, the empirical testing found that all interactions have no effect on relationship performance, even though buyer-held specific investments and formalization individually have significant positive effects on cost-reduction outcomes. Supplier-held specific investments per se have a significant positive effect on end-product enhancement outcomes. Buyer-held specific investments and formalization individually have significant positive effects on satisfaction with the collaboration.

6.1.4. Relationship of specific investments and relational governance

A model was tested in which four dimensions of relational governance were caused by both supplier-held and buyer-held specific investments. The empirical testing found that these hypotheses were partially supported. In sub-model 1, buyer-held specific investments have significant positive effects on all four dimensions of relational governance. Contrary to expectation, however, supplier-held specific investments have significant negative effects on flexibility, solidarity, and restraint to the use of power, and have no effect on information exchange.

This implies that relational governance works as a safeguarding mechanism only when buying firms make specific investments. However, unobserved variables not included in this model may cause this negative-association or no-association of supplier-held specific investments and relational governance.

6.1.5. Relationship of relational governance and relationship performance

A model was tested in which four dimensions of relational governance have direct effects on three dimensions of relationship performance. The empirical testing found that these hypotheses were partially supported. Flexibility has a significant positive effect on satisfaction with the collaboration; however, contrary to expectation, it has a significant negative effect on end-product enhancement outcomes and no effect on cost reduction outcomes. Solidarity has a significant positive effect on cost reduction outcomes, and on satisfaction with collaboration, but no effect on end-product enhancement outcomes. Information exchange has significant positive effects on all three dimensions of relationship performance. Restraint to the use of power has no effects on the three dimensions of relationship performance.

6.1.6. Alignment of specific investments and relational governance

The model (sub-model 4.1b) included both the direct effects and interaction effects of supplier-held specific investments, buyer-held specific investments, flexibility, solidarity, information exchange, and restraint to the use of power on all three dimensions of relationship performance. However, not all interactions were included; only the significant interactions found in the preliminary test were included. A model was tested in which four dimensions of relational governance were caused by supplier-held and buyer-held specific investments at the fixed levels of un-standardized estimates found in sub-model 1, since the model was non-convergent if these path coefficients were freely estimated.

With regard to the direct effect of relational governance on relationship performance in the interaction model (sub-model 4.1b), the empirical testing found that those hypotheses were partially supported. Only information exchange has a significant positive effect on satisfaction with the collaboration. Other direct effects did not have any effects on relationship performance. It is noteworthy that after including interaction effects, the effect of relational governance changed from being became less significant or insignificant from significant in the direct effect model (sub-model 1) to less significant or insignificant (for further detail see Section 6.2.2).

With regard to the interaction of specific investments and relational governance on relationship performance, the empirical testing found that all hypotheses were rejected. None of the interaction effects of specific investments and relational governance has a significant effect on relationship performance, even though some were found to be significant in the preliminary individual test.

6.2. Relationship of governance modes and negotiation strategies

The purpose of Section 6.2 is to explain the relationship between governance modes and negotiation strategies, based on the empirical findings of this study. Section 6.2.1 presents results of the test for direct-effect of negotiation strategies on relationship performance. Section 6.2.2 presents results of the test for the relationship between hierarchical governance and negotiation strategies. Section 6.2.3 presents results of the test for the relationship between relational governance and negotiation strategies.

6.2.1. Effect of negotiation strategies on relationship performance

The next step was a test of the common findings of the previous empirical research regarding outcomes of the two negotiation strategies. The relationship between aggressive negotiation strategies and relationship performance was hypothesized to be negative, while the relationship between problem-solving negotiation strategy and relationship performance was hypothesized to be positive.

A test was conducted of a model (sub-model 1) in which three dimensions of relationship outcomes (cost reduction outcomes, end-product enhancement outcomes, and satisfaction with the collaboration) were caused by two styles of negotiation strategies. The empirical testing found that the hypothesis 5 was rejected, while hypothesis 6 was partially supported (see Table 5.8). Problem-solving negotiation strategy has significant positive effects on end-product

enhancement outcomes and satisfaction with collaboration, but has no effect on cost reduction outcomes. However, aggressive negotiation strategy, contrary to expectation, has a significant positive effect on cost reduction outcomes, and no effects on end-product enhancement outcomes and satisfaction with the collaboration.

6.2.2. Interaction of hierarchical governance and negotiation strategies

Sub-model 3 was used to test the hypotheses concerning the interaction between hierarchical governance and negotiation strategies. These interactions were hypothesized in two ways. If the negotiation strategy is the problem-solving approach, the impact of hierarchical governance on relationship performance should be positive. If the negotiation strategy is aggressive, the impact of hierarchical governance on relationship performance should be negative. However, only two significant interactions found in the preliminary individual test were included. Moreover, the model also included (a) direct effects of specific investments on governance modes and (b) direct effects of formalization, centralization, aggressive negotiation strategies, and problem-solving negotiation strategy on all three dimensions of relationship performance.

With regard to direct effect (see Table 5.8), the empirical testing found that hypothesis 1 was partially supported. Supplier-held specific investments have significant positive effects on formalization and centralization. But buyer-held specific investments have significant negative effects on formalization and centralization. This is similar to the result from direct-effect model (sub-model 1). For further detail, see Section 6.1.3.

Hypotheses 3 was partially supported. Formalization has significant positive effects on cost reduction outcomes and satisfaction with the collaboration, but no effect on end-product enhancement outcomes. These results are similar to results from the direct-effect model (sub-model 1), with the exception of the effect of formalization on end-product enhancement outcomes being significant in that model, but insignificant in this model.

Hypothesis 5 was partially supported. Aggressive negotiation strategy has significant negative effects on end-product enhancement outcomes and satisfaction with the collaboration, but no effect on cost reduction outcomes. These results are opposite to the results from the direct-effect model (sub-model 1). In that model, aggressive negotiation strategy has a significant positive effect on cost reduction outcome, but no effects on end-product enhancement outcomes and satisfaction with the collaboration. The possible reason for this incongruence may be seen when all results in Table 5.8 are considered. Sub-model 3 is the only model of the

four sub-models that does not include relational governance. Sub-model 3 is the only model in which aggressive negotiation strategy has significant negative effects on end-product enhancement outcomes and satisfaction with the collaboration. This implies that when relational governance is included in the model, aggressive negotiation strategy has no effects on end-product enhancement outcomes and satisfaction with the collaboration. However, this pattern did not seem to apply to cost reduction outcomes, since sub-model 1 has different results than sub-model 4.1b and 4.2b regarding this matter.

In the interaction model (sub-model 3), hypothesis 6 was rejected. Problem-solving has no effects on all three dimensions of relationship outcomes. This result is different from the direct effect model (sub-model 1) and other interaction effect models (sub-models 4.1b and 4.2b). However, the results of all four models do not show any patterns that lead to further hypotheses.

Hypothesis 10 was partly supported. Only hypothesis 10d was supported. Hypothesis 10b was rejected, though it was found to be significant in the preliminary test. The interaction of centralization and problem-solving negotiation strategy has a significant positive effect on end-product enhancement outcomes, but no effect on cost reduction outcomes. It is noteworthy that centralization and problem-solving negotiation strategy per se have no effect on end-product enhancement outcomes.

6.2.3. Interaction of relational governance and negotiation strategies

The interaction between relational governance modes and negotiation strategies was hypothesized in two ways. If the negotiation strategy is a problem-solving approach, the impact on relationship performance should be positive. If the negotiation strategy is aggressive, the impact on relationship performance should be negative.

Sub-model 4.2b was used for testing hypotheses concerning the interaction between relational governance and negotiation strategies. Only the interaction of information exchange and problem-solving negotiation strategy was included in the mode (according to hypothesis 12g), because other interactions were found insignificant in the preliminary individual test.

In the model, the interaction and other direct effects were included. They are (a) the effect of supplier-held and buyer-held specific investments on relational governance, (b) the effect of four dimensions of relational governance on three dimensions of relationship performance, and

(c) the effect of two styles of negotiation strategy on relationship performance, according to Hypotheses 5a, 5b, 5c, 6a, 6b, and 6c.

With regard to direct effect, Hypothesis 4 was partially supported. Only Hypotheses 4c and 4k were supported. Information exchange has significant positive effects on cost reduction outcomes and satisfaction with the collaboration. Compared to other models, these results are similar to results from sub-model 4.1b, in that hypothesis 4k was supported, while other sub-hypotheses of hypothesis 4 were rejected, (with the exception of hypothesis 4c, which was supported).

Hypothesis 5 was rejected. Aggressive negotiation strategy has no effect on relationship performance. This result is consistent with another interaction effect model (sub-model 4.1b).

Hypothesis 6 was partially supported. Problem-solving negotiation strategy has significant positive effects on end-product enhancement outcomes and satisfaction with the collaboration, but no effect on cost reduction outcomes. This result is consistent with the direct effect model (sub-model 1).

With regard to interaction effect, the empirical findings show that hypothesis 12g was rejected; the interaction of information exchange and problem-solving negotiation strategy, contrary to expectation, has a significant negative effect on end-product enhancement outcomes. Information exchange individually has no effect on end-production enhancement outcomes, but problem-solving negotiation has a significant positive effect. This implies that information exchange decreases the effect of problem-solving negotiation strategy.

6.3. The impact of power structure relationship on TCE

Section 6.3 present results from the test for impact of power structure on TCE. Section 6.3.1 details the results of the test for impact of asymmetric power on TCE. Section 6.3.2 details results of the test for the difference between asymmetric-power and symmetric-power relationships. Section 6.3.3 details empirical results of the test for the difference between mutual-dependence and no-interdependence.

6.3.1. Stronger firms versus weaker firms

In asymmetric-power relationships, a stronger firm can extract the best exchange terms by using its power (Beier & Stern, 1969).In contrast, to protect itself from opportunistic behaviours of

partner firms, a weaker firm needs to employ a more integrated structure as it makes specific investments. It seems less motivating for a stronger firm to develop relational governance, because the stronger firm is likely to retain its right to use its power to earn unilateral benefits from the relationships at the expenses of its weaker partner (Dwyer & Walker, 1981; Frazier et al., 1989; Frazier & Rody, 1991; Kale, 1986; Roering, 1977; Wilkinson & Kipnis, 1978). In contrast, weaker firms might be motivated to employ relational governance because they can benefit from relational norms that enhance the well-being of the relationship as a whole (Dwyer et al., 1987; Kaufmann & Stern, 1988; Heide & John, 1992).

The expectation of the hypothesis is that TCE is better at explaining firms with lower power. The effects of weaker-held specific investments on hierarchical and relational governance were expected to be higher than the effect of stronger-held specific investments. A test was made of a model in which (a) factor loadings of both stronger-held specific investments and weaker-held specific investments were equality restricted and (b) both stronger-held and weaker-held specific investments lead to two dimensions of hierarchical governance and four dimensions of relational governance. This enabled comparison of the effects of strong-held specific investments and weaker-held specific investments on governance modes.

With regard to hierarchical governance, the empirical testing found that hypothesis 13 was partially supported. Hypothesis 13a was supported. Weaker-held specific investments have a significant positive effect on formalization, but stronger-held specific investments have no effect on formalization. Hypothesis 13b was rejected. Both stronger-held and weaker-held specific investments have no effect on centralization.

With regard to relational governance, hypothesis 13c was rejected. Stronger-held specific investments have a significant positive effect on flexibility, but weaker-held investments have no effect on flexibility. Hypotheses 13d and 13e were rejected. Both types of specific investments have no effects on solidarity and information exchange. Hypothesis 13f was rejected. Weaker-held specific investments have a significant negative effect on restraint to the use of power, but stronger-held investments have no effect on restraint to the use of power.

In summary, hypothesis 13 was partially supported. The TCE prediction works well with weaker firms using formalization and with stronger firms using flexibility.

6.3.2. Asymmetric-power versus symmetric-power relationships

The expectations of the hypotheses are that (a) specific investments are more positively related to hierarchical governance in an asymmetric-power relationship than in a symmetric-power relationship, and (b) specific investments are more positively related to relational governance in a symmetric-power relationship than in an asymmetric-power relationship.

The empirical testing found that the effect of specific investments on relational governance behaves differently across asymmetric-power and symmetric-power groups. Hypothesis 14 was partially supported. Hypotheses 14a and 14c were supported. Supplier-held specific investments are more positively related to formalization and centralization in asymmetric-power relationship than in symmetric-power relationships. Contrary to expectation, hypotheses 14b and 14d were rejected. Buyer-held specific investments have significant and non-significant negative effects on both formalization and centralization in both groups.

With regard to relational governance, Hypotheses 15d and 15h were supported. Buyer-held specific investments are more positively related to solidarity and restraint to the use of power in symmetric-power relationships than in asymmetric-power relationship. Hypotheses 15a, 15b, 15c, 15e, 15f, and 15g were rejected. Supplier-held specific investments have no effect on flexibility in symmetric-power relationships, while they a have significant negative effect in asymmetric-power relationships. Buyer-held specific investments have no effect in symmetric-power relationships, while they have a significant positive effect in asymmetric-power relationships. Supplier-held specific investments have a significant negative effect on solidarity in symmetric-power relationships, while they have no effect in asymmetric-power relationships. Supplier-held and buyer-held specific investments have no effects on information exchange in both groups. Supplier-held specific investments have significant negative effects on restraint to the use of power in both groups.

6.3.3. Mutual-dependent versus no-interdependent relationships

This study hypothesizes that specific investments are more positively related to hierarchical governance in no-interdependent relationships than in mutual-dependent relationships, according to hypothesis 16. Furthermore, this research also expects that specific investments are more positively related to relational governance in mutual-dependent relationships than in no-interdependent relationship, according to hypothesis 17.

The analysis began with the test for weak measurement invariance. The results show that only the model used to test hypothesis 16 fit the data. The model for testing both hypotheses 16 and

17 together, and the model for testing hypothesis 17 alone, do not fit the data. Therefore, further testing of hypothesis 17 could not be carried out. Only hypothesis 16 could be tested.

The test for structural invariance could be conducted only for hypothesis 16. The empirical testing found the group members of mutual-dependence and no-interdependence moderate the effects of specific investments on hierarchical governance. The empirical testing shows that hypothesis 16 is partially supported. Hypotheses 16a and 16c were supported. Supplier-held specific investments are more positively related to formalization and centralization in a no-interdependent relationship than in a mutual-dependent relationship. Hypotheses 16b and 16d were rejected. Buyer-held specific investments have no effect on formalization in a no-interdependent relationship, while they have a significant negative effect in a mutual-dependent relationship. Moreover, buyer-held specific investments have significant negative effects on centralization in both groups.

6.4. Summary

In summary, the findings in this dissertation provide partial support for the core prediction of TCE, which is consistent with the findings of David and Han (2004). Furthermore, the findings show partial support for hypotheses regarding the effect of power structure on the TCE framework. In asymmetric-power relationships, TCE works well when weaker firms make specific investments and use formalization. The relationship between specific investments and governance modes behaves differently among various types of power structures. With regard to interaction of negotiations and governance modes, testing shows the surprising result that information exchange reduces the positive effect of problem-solving negotiation strategy on end-product enhancement outcomes (see Chapter 7 for detailed discussions). Summaries of the findings are presented in Tables 6.1, 6.2, 6.3, and 6.4.

Table 6.1 Summary of antecedent hypotheses to modes of governance and relationship performance

		Sign	Sub-model 1	Individual interaction models	Sub-model 3	Sub-model 4.1b	Sub-model 4.2b
H1a	SSI → FORM	+	Supported		Supported		
H1b	BSI → FORM	+	No effect		Negative effect		
H1c	SSI → CENT	+	Supported		Supported		
H1d	BSI → CENT	+	Negative effect		Negative effect		
H2a	SSI → FLEX	+	Negative effect				
H2b	BSI → FLEX	+	Supported				
H2c	SSI → SOL	+	Negative effect				
H2d	BSI → SOL	+	Supported				
H2e	SSI → INF	+	No effect				
H2f	BSI → INF	+	Supported				
H2g	SSI → RPW	+	Negative effect				
H2h	BSI → RPW	+	Supported				
H3a	FORM → CRO	+	Supported		Supported		
H3b	CENT → CRO	+	No effect		No effect		
H3c	FORM → EPE	+	Supported		No effect		
H3d	CENT → EPE	+	No effect		No effect		
H3e	FORM → SAT	+	Supported		Supported		
H3f	CENT → SAT	+	No effect		No effect		
H4a	FLEX → CRO	+	No effect			No effect	No effect
H4b	SOL → CRO	+	Supported			No effect	No effect
H4c	INF → CRO	+	Supported			No effect	No effect
H4d	RPW → CRO	+	No effect			No effect	No effect
H4e	FLEX → EPE	+	Negative effect			No effect	No effect
H4f	SOL → EPE	+	No effect			No effect	No effect
H4g	INF → EPE	+	Supported			No effect	No effect
H4h	RPW → EPE	+	No effect			No effect	No effect
H4i	FLEX → SAT	+	Supported			No effect	No effect
H4j	SOL → SAT	+	Supported			No effect	No effect
H4k	INF → SAT	+	Supported			Supported	Supported
H4l	RPW → SAT	+	No effect			No effect	No effect
H5a	AGG → CRO	+	Supported		No effect	No effect	No effect
H5b	AGG → EPE	+	No effect		Negative effect	No effect	No effect
H5c	AGG → SAT	+	No effect		Negative effect	No effect	No effect
H6a	PSV → CRO	+	No effect		No effect	No effect	No effect
H6b	PSV → EPE	+	Supported		No effect	Supported	Supported
H6c	PSV → SAT	+	Supported		No effect	No effect	Supported
H7b	BSI * FORM → CRO	+		Negative effect	No effect		
H7d	BSI * CENT → CRO	+		Supported	No effect		
H7g	SSI * CENT → EPE	+		Supported	No effect		
H7h	BSI * CENT → EPE	+		Supported	No effect		
H7j	BSI * FORM → SAT	+		Negative effect	No effect		
H7l	BSI * CENT → SAT	+		Supported	No effect		
H8b	BSI*FLEX → CRO	+		Negative effect		No effect	
H8d	BSI*SOL → CRO	+		Negative effect		No effect	
H8f	BSI*INF → CRO	+		Negative effect		No effect	
H8h	BSI*RPW → CRO	+		Negative effect		No effect	
H8n	BSI*INF → EPE	+		Negative effect		No effect	
H8p	BSI*RPW → EPE	+		Negative effect		No effect	
H8r	BSI*FLEX → SAT	+		Negative effect		No effect	
H8x	BSI*RPW → SAT	+		Negative effect		No effect	
H10b	CENT* PSV → CRO	+		Supported	No effect		
H10d	CENT* PSV → EPE	+		Supported	Supported		
H12g	INF*PSV → EPE	+		Negative effect			Negative effect

Table 6.2 Summary of asymmetric power hypotheses

Note: For example, (WKSI → FORM) > (STSI → FORM) means effect of weaker-held specific investments on formalization is greater than the effect of stronger-held specific investments on formalization.

H13a	(WKSI → FORM) > (STSI → FORM)	Supported
H13b	(WKSI → CENT) > (STSI → CENT)	No effect
H13c	(WKSI → FLEX) > (STSI → FLEX)	Rejected (reversed)
H13d	(WKSI → SOL) > (STSI → SOL)	No effect
H13e	(WKSI → INF) > (STSI → INF)	No effect
H13f	(WKSI → RPW) > (STSI → RPW)	Rejected (negative effect)

Table 6.3 Summary of asymmetric and symmetric power hypotheses

Note: For example, Asym(SSI → FORM) > Sym(SSI → FORM) means supplier-held specific investments are more positively related to formalization under asymmetric-power relationship than under symmetric-power relationship.

H14a	Asym(SSI → FORM) > Sym(SSI → FORM)	Supported
H14b	Asym(BSI → FORM) > Sym(BSI → FORM)	Rejected (no effect)
H14c	Asym(SSI → CENT) > Sym(SSI → CENT)	Supported
H14d	Asym(BSI → CENT) > Sym(BSI → CENT)	Rejected (negative effect)
H15a	Sym(SSI → FLEX) > Asym(SSI → FLEX)	Rejected (negative effect)
H15b	Sym(BSI → FLEX) > Asym(BSI → FLEX)	Rejected (reversed)
H15c	Sym(SSI → SOL) > Asym(SSI → SOL)	Rejected (negative effect)
H15d	Sym(BSI → SOL) > Asym(BSI → SOL)	Supported
H15e	Sym(SSI → INF) > Asym(SSI → INF)	Rejected (no effect)
H15f	Sym(BSI → INF) > Asym(BSI → INF)	Rejected (no effect)
H15g	Sym(SSI → RPW) > Asym(SSI → RPW)	Rejected (negative effect)
H15h	Sym(BSI → RPW) > Asym(BSI → RPW)	Supported

Table 6.4 Summary of symmetric power hypotheses

Note: For example, Mut(SSI → FORM) > No-dep(SSI → FORM) means supplier-held specific investments are more positively related to formalization under mutual-dependent relationship than under no-interdependent relationship.

H16a	Mut(SSI → FORM) > No-dep(SSI → FORM)	Supported
H16b	Mut(BSI → FORM) > No-dep(BSI → FORM)	Rejected (negative effect)
H16c	Mut(SSI → CENT) > No-dep(SSI → CENT)	Supported
H16d	Mut(BSI → CENT) > No-dep(BSI → CENT)	Rejected (negative effect)

7. Discussion

First, this chapter discusses important findings and non-findings of this study in relation to theory and previous empirical findings. Second, it provides theoretical implications. Third, it presents implications for managerial decision making. Finally, it discusses limitations and suggests possible future research.

7.1. Discussion of the results

There are two main contributions of this study. First, by presenting a thorough examination of the impact of power structure on association between specific investments and governance modes, it argues that TCE is not equally applicable to all types of firms. Second, it expands TCE by integrating governance modes with negotiation strategies.

7.1.1. Discussion on the impact of power structure power on TCE

This study begins its investigation with the test for the core prediction of TCE, i.e., specific investments leads to hierarchical governance. The results from the empirical testing in the Norwegian O & G industry showed that the prediction of TCE is partially supported. TCE prediction works well when supplying firms make specific investments. Supplier-held specific investments are positively related to both formalization and centralization. But TCE prediction does not work with the investments of buying firms. Buyer-held specific investments are negatively related to both formalization and centralization.

Why is the TCE prediction "partially" supported? This study proposes that asymmetric-power relationship may be a potential unobserved variable moderating the effect of specific investments on hierarchical governance. The further investigation in this study hypothesized that an asymmetric-power relationship between buyer and supplier could be a reason why TCE prediction does not work with buyer-held specific investments.

Buying firms in this study are oil firms that generally have more power than their suppliers do, rendering them as having asymmetric-power relationships. Further investigation in this study (i.e., hypothesis 13) empirically found that TCE prediction works well with weaker-held specific investments. Further, the test for structure invariance shows that TCE provides a better explanation of supplier firms in asymmetric-power relationships than it does of firms in symmetric-power relationships, when hierarchical governance is considered. The findings show that supplier-held specific investments are more positively related to hierarchical

governance in asymmetric-power relationships than in symmetric-power relationships, according to hypothesis 14.

These findings are consistent with the findings of Shervani et al. (2007), that firms with lower power need to rely on highly integrated forward channel to lower transaction costs. But firms with higher power have the ability to monitor and exercise legitimate authority to reduce transaction costs rather than using an integrated forward channel. Bucklin and Sengupta's (1993) findings explains why weaker firms need a more integrated governance structure. They find that contractual governance (analogous to formalization) helps to reduce the damaging perceptions of power asymmetry. Nevertheless, these findings are inconsistent with Heide and John's (1988) and Buvik and Reve's (2002) findings. Heide and John (1988) show that weaker firm do have the ability to conduct more integrated governance, while Buvik and Reve (2002) argue that as buyer's power increases, the buyer uses its power to protect its specific investments with comprehensive contracts. Thus, buyer-held specific investments are strongly associated with formalized purchased contracts.

With regard to relational governance, this study also began with the test for incorporation relational governance into TCE when it is considered a governance mechanism that safeguards specific investments (Poppo & Zenger, 2002; Heide & John, 1992). Many previous research studies empirically support the positive association between specific investments and relational governance (e.g., Anderson & Buvik, 2001; Bello & Gilliand, 1997; Poppo & Zenger, 2002). The empirical results in this study showed that relational governance is well incorporated into the TCE framework only when buying firms make specific investments, according to hypothesis 2. Buyer-held specific investments are positively related to all four dimensions of relational governance, while supplier-held specific investments are negatively related to flexibility, solidarity, and restraint to the use of power; they have no effect on information exchange. In other words, when considering relational governance, TCE better explains buying firms than supplying firms.

Why is the incorporation of relational governance only "partially" supported? Similar to the case of hierarchical governance, it was also expected that an asymmetric-power relationship might moderate the effect of supplier-held specific investments on relational governance.

As previously mentioned, most buying firms in this study are firms with high power and most supplying firms are firm with low power. The results seems to suggest that when considering relational governance, TCE better explains firms with high power than firms with low power.

This opposes the expectation and is incongruent with the findings of Geyskens et al. (1996), that when interdependence asymmetry increases, calculative commitment (or the need to maintain the relationship) decreases for the stronger party, and increases for the weaker party.

Further investigation was conducted by checking the moderating effect of asymmetric power on the association between specific investments and relational governance, according to hypothesis 13. The hypothesis proposed that TCE better explains weaker firms than stronger firms, because weaker firms may need relational governance to counter balance the power of their stronger partner, while stronger firms may not need relational governance as it may hinder them from using their power. Nevertheless, the findings show that hypothesis 13 was rejected. TCE better explains high-power firms than low-power firms when flexibility is considered. In other words, relational governance can be well incorporated into TCE when stronger firms make specific investments and only when flexibility is considered.

Further findings show the type of relationship—asymmetric power or symmetric power—that TCE better explains when relational governance is considered, according to hypothesis 15. The findings show that (a) TCE better explains buying firms in symmetric-power relationships than buying firms in asymmetric-power relationship when considering solidarity and restraint to the use of power, and (b) TCE better explains buying firms in asymmetric-power relationships than symmetric-power relationships, when flexibility is considered.

With regard to related previous empirical findings, there do not appear to be any studies that empirically investigate the extent to which specific investments made by stronger firms or weaker firms are related to relational governance. All previous research focuses on the relationships between power architecture (i.e., asymmetric power, mutual dependence) and relational governance (or similar concepts). However, there are studies that have a similar implication. For example, Kumar et al. (1995) finds that asymmetric power reduces trust, while mutual dependence increases trust. This is similar to the findings of hypothesis 15, that TCE better explains buying firms in symmetric-power relationships than buying firms in asymmetric-power relationships, when solidarity and restraint to the use of power are considered.

Nevertheless, it can be argued that the findings in this study are inconsistent with this previous research, according to the findings of hypothesis 15, that TCE better explains buying firms in asymmetric-power relationships than symmetric-power relationships, when flexibility is considered.

7.1.2. Discussion on the integration of governance structure and negotiation strategy

Previous research suggests an association between governance modes and negotiation strategies (Lumineau & Henderson, 2009; Ness & Haugland, 2005; Ness, 2009; Schurr & Ozanne, 1985). This study, therefore, proposes that the use of governance modes and negotiation strategies together may enhance understanding of the relationship performance.

Previous research suggests that inter-firm performance increases when firms adopt governance structure to reduce transaction costs, mitigate opportunistic behaviour, and facilitate cooperation (Cannon, Achrol, & Gundlach, 2000; Dahlstrom & Nygaard, 1999; Ghosh & John, 2005; Heide & John, 2002; Poppo & Zenger, 2002), and when firms use problem-solving negotiation strategy to interact to reach successful agreements (e.g., Clopton, 1984; Ganesan, 1993; Graham, 1986; Pruitt, 1981). Empirical results of this study confirm and advance this literature and extend previous research by demonstrating that the centralization and problem-solving negotiation strategies strengthen each other's effect on end-product enhancement outcomes. However, in the same model (see sub-model 3 in Table 5.8), although centralization and problem-solving negotiation strategies individually have no effects on end-product enhancement outcomes; their interaction has a significant effect on this outcome.

The most surprising findings are that the interaction between information exchange and problem-solving negotiation strategy is negatively related to end-product enhancement outcomes, while problem solving alone is positively related to this outcome and information exchange has no effect on this outcome. These findings suggest that information exchange reduces the positive effect of problem-solving negotiation strategy on end-product enhancement outcomes. This negative interaction effect seems somewhat curious. There does not appear to be any previous literature or empirical research that suggests the negative effect of information exchange on relationship performance. Moreover, the negotiation strategy of problem solving per se requires information exchange. However, this finding may be evidence that information exchange can play a negative role in promoting the successful end products for supplying firms. Further research is needed to examine the extent to which the use of information exchange and various types of information has a negative effect on end-production enhancement outcomes.

7.2. Theoretical implications

This section presents the theoretical implications. There are two aspects of inter-firm relationships that this study has addressed. First, it demonstrates the impact of power structure on association between specific investments and governance mechanisms. Second, it presents the theoretical implication of the integration of governance modes and negotiation strategies.

7.2.1. Impact of power structure on TCE

Findings from this study provide partial support to the core prediction of standard TCE and suggest that TCE cannot fully explain how firms choose governance mechanisms. This study suggests that mode of governance is contingent not only on specific investments, but also on the power structure between partner firms. Power structure tends to moderate the association between specific investments and governance mode. This finding coincides with Shervani et al. (2007), in that there is a significant and positive association between weaker-held specific investments and formalization, but no association between stronger-held specific investments and formalization. Under asymmetric-power relationships, stronger firms seem to have the ability to have their specific investments safeguarded by their power. In contrast, weaker firms seem to need formalization to safeguard their specific investments. This implies that TCE has scope conditions, i.e., it cannot provide equally good explanations of how all firms choose control structures. When considering formalization as a mode of governance, TCE better explains weaker firms than stronger firms. When considering flexibility as a mode of governance, it provides a better explanation of stronger firms than weaker firms.

This study advances and extends previous research by comparing how well TCE explains the behaviour of firms in various types of power structure relationships. The findings of this study suggest that the extent to which the TCE governance mode is moderated by the power structure depends on the types of relationships between buying and selling firms. For example, in asymmetric-power relationships, supplier-held specific investments are more positively related to formalization than in symmetric-power relationships. This implies that the TCE framework should be augmented with the condition of power structure.

7.2.2. Integration of governance mode and negotiation strategy

The successful performance of buyer-supplier relationships depends, at least to some degree, on how their relationships are organized (Williamson, 1975) and how partner firms negotiate (e.g., Day, Michaels, & Perdue, 1988). Although a substantial body of research examines how governance choices and negotiation strategies influence the relationship performance, little of

this work integrates these two concepts (i.e., Lumineau & Henderson, 2009; Ness & Haugland, 2005; Ness, 2009; Schurr & Ozanne, 1985).

This study aims to expand the understanding of inter-firm performance by examining synergistic effects of modes of governance and negotiation strategies on relationship performance. Governance mechanisms help firms by structural means to maximize profit by mitigating transaction costs, while negotiation strategies help firms to reach successful agreement through the negotiation process. There are two main findings regarding integration of governance mode and negotiation strategy.

First, centralization and problem-solving negotiation strategies have positive interaction effects on end-product enhancement outcomes. In any inter-firm relationship, end-product enhancement entails using different materials, components, or designs in an adaptation manner that will increase customer utility (Ghosh & John, 2005). Problem-solving negotiation strategy facilitates this process by discovering ways to increase benefits to both partner firms, while centralization allows one firm to impose decisions on another firm, rather than relying on complete contract terms. As Ghosh and Johh (2005) found, end-product enhancement requires incomplete contracts to support specific investments.

Second, information exchange is more likely to hinder the positive effect of problem-solving negotiation strategy on end-product enhancement outcomes. Increasing the desirability of end products requires partner firms to work together to evaluate alternatives due to more complex and cutting-edge components. However, the bilateral expectation that partner firms will proactively provide useful information exchange was found to reduce the positive effect of problem-solving strategy on end-product enhancement outcomes. An important insight of this finding is that information exchange is not always a positive antecedent.

7.3. Managerial implications

From a management point of view, this research provides insights on appropriate strategies for managers who aim to form and coordinate inter-firm relationships. It argues that managers should consider the characteristics of their inter-firm power and negotiation strategy. In this section, there are some guidelines suggesting how to approach this matter. Section 7.3.1 discusses why power structure is important, and how it effects TCE. Section 7.3.2 discusses why negotiation is important and identifies its role in implementation of market positioning strategies.

7.3.1. Power asymmetry in buyer-supplier relationships

Asymmetric-power relationships between partner firms involve interactions between stronger and weaker firms. This relationship is observable, since one firm is dependent on its partner firm. On one side, asymmetric power encourages stronger firms to behave opportunistically toward their weaker partners. This hinders the development of effective buyer-supplier relationships. On the other side, power provides stronger firms with an effective tool to coordinate and promote fruitful relationships.

It is an advantage to acknowledge that asymmetric-power relationships have a moderating effect on TCE. Empirical results from this study found that specific investments made by stronger firms have no association with hierarchical governance. This suggests that stronger firms may be able to reduce transaction costs and manage relationships with their weaker partner firms without hierarchical governance. This finding lends support to the contention of Shervani et al. (2007) that managers should evaluate their firm's power before making the forward channel integration. Firms with high power can handle hazards associated with using market governance when specific investments and uncertainty are high. Although exchanges are organized within a market governance structure, stronger firms are likely to be able to exercise legitimate authority, monitor behaviour, and offer effective incentives by influencing weaker firms' decisions on, for example, prices, terms, amount of information, and work activities. This helps stronger firms avoid the high cost of hierarchical governance.

With regard to weaker firms, empirical results from this study support the contention that specific investments made by weaker firms are positively related to formalization. This lends support to the common tenet of TCE. Weaker firms may not be able to reduce transaction costs through market governance; therefore, they are motivated to adopt formalization, when rules are specified, to reduce transaction costs.

With regard to relational governance, asymmetric-power relationships have been found to have a moderating effect on the relationship between specific investments and relational governance. Weaker firms may be able to handle transaction hazards and manage relationships with their stronger partner firms without relational governance. This finding, combined with the results from testing of the same model, shows that when weaker firms make specific investments, they tend to safeguard these investments by relying on formalization. For weaker firms, relational governance as a non-juridical mechanism does not have sufficient safeguarding capability.

In contrast, empirical results from this study found that specific investments made by stronger firms are positively related to flexibility. This may lend support to the finding of this study that stronger firms do not choose to use hierarchical governance, but rather use the norm of flexibility and their power to safeguard their specific investments.

7.3.2. Negotiation strategies, governance structures, and implementation of market position strategies

Partner firms commonly communicate or negotiate with one another to reach agreement. Many previous studies support the contention that problem-solving strategy positively influences a firm's profits and satisfaction (e.g., Clopton, 1984; Ganesan, 1993; Graham, 1986; Pruitt, 1981). However, empirical results from this study found mixed results when problem-solving negotiation strategy interacts with governance structure.

The first result, as expected, is that there is a positive interaction effect between centralization and problem-solving negotiation strategy on end-product enhancement outcomes, while neither centralization or problem-solving negotiation strategy have any effect on end-product enhancement outcomes. This suggests that in inter-firm relationships characterized by a high degree of authority (where one firm can impose decisions on another firm), problem-solving negotiation strategy may enhance end-product enhancement outcomes (Ghosh & John, 2005), i.e., the joint net gains from increased customer utility delivered by the end product. This finding is essential, because centralization alone or problem-solving strategy alone may not be able provide firms with end-product enhancement outcomes.

A practical recommendation of this finding is that managers of supplier firms who wish to achieve a differentiation advantage relative to their competitors should identify dominant parties within their customer firms who may be able to impose decisions on other parties. With regard to such dominant parties, managers should place high importance on both relationship and end-product enhancement outcomes. Firm managers must take into account mutual interest when interacting with their partners and jointly developing and adopting mutually beneficial agreements. With this approach, supplier firms may retain their goal of differentiation advantage.

The second finding is contrary to expectation. Empirical results from this study found a negative interaction effect of information exchange and problem-solving negotiation strategy on end-product enhancement outcomes; information exchange has no effects on these

outcomes, but problem-solving strategy has positive effects on theses outcomes. These results suggest that information exchange reduces the positive effect of problem-solving negotiation strategy. When problem-solving negotiation strategy is applied, the norm of information exchange may reduce the expected positive results of this negotiation strategy on end-product enhancement outcomes.

In practice, if the goal of supplying firms is to achieve a differentiation advantage, managers of supplying firms should first identify whether they use problem-solving negotiation strategy, (which secures the best results for their own side while maintaining positive long-term working relationships), to achieve agreements on exchange conditions. If so, they should exchange information with partner firms with caution. Information exchange is found to hinder the positive results from problem-solving negotiation strategy on reaching the goal of differentiation advantage. Although information exchange can mitigate opportunism and safeguard specific investments, it hinders a firm's opportunity to attain its goal of differentiation advantage through problem-solving negotiation strategy.

7.4. Limitations and suggestions for future research

Although this study advances the TCE literature in several ways, it has limitations that must be considered.

First, although the study introduces the effect of power structure on TCE, it examined forward integration governance (i.e., data from the supplier side). The element of power structure is also found in backward integration governance (i.e., data from the customer side), a mode that applies, for example, to relationships in which many retailing gas stations depend on their oil firms. While the rationales presented and verified by this study for forward integration governance effects are useful in understanding how firms choose their governance structures, their application to a backward integration context can only be evaluated after further study.

Second, this research presents the importance of an integration of governance structures and negotiation strategies. It is similar to the work of Lumineau and Henderson (2009), and Ness and Haugland (2005), who consider the implication between the two concepts. These findings extend the scope of research on governance structures beyond a common tenet of TCE and a contingent alignment by considering the implication of negotiation strategies. Further research examining governance effects as contingent alignment effects within ongoing supplier-buyer governance could provide important insights into supplier-buyer governance. For example, as

a starting point, researchers may examine how buying firms influence, and are influenced by, supplying firms' negotiation strategies. In addition, issues of superior relationship performance are central to the approach of this study. The exploration of how the asymmetric-power relationship contributes to these aspects of performance would further the understanding of both asymmetric-power relationships and governance structures.

Third, this study applies only two (i.e., problem-solving and aggressive) of many negotiation strategies. Other strategies (i.e., accommodative, avoiding, and compromising) could be integrated in the framework. This study chose not to expand the research model due to the already high complexity of the model.

Fourth, although this study has a careful plan for data collection, the sample size of 198 is relatively small considering that SEM was used for data analysis. Wang and Wang (2012) suggests that $N = 100 – 150$ is considered the minimum sample size. Thus, it was sufficient for testing hypotheses 1-6. However, hypotheses 7-17 require greater numbers of data due to the complexity of the model, and multi-group modelling used in testing hypotheses 13-17 requires 100 observations per group (Kline, 2005). Future research is needed to acquire more observations. Further research could use more than one industry to consider the same characteristics of asymmetric power. In addition, future study could make a cross-industry comparison..

Fifth, the constructs of relationship performance used in this study are measured in a subjective manner, using the Likert scale. This seems sufficient. However, future research may be more reliable if it also includes objective measureable indicators.

Sixth, although data used are from the Norwegian O & G industry (which is acceptable because asymmetric-power relationships between oil firms and their suppliers are common in many countries), the issue arises of whether these findings are restricted to the O & G industry. Although certain industrial characteristics might influence governance under asymmetric-power relationships in the O & G industry, it is believed that the fundamental theoretical tenets uncovered by this study have broad implications. For example, asymmetric-power relationships are common not only in the O & G industry but in other industries, including chain-store retailing and franchised grocery stores, where manufacturers and suppliers depend very much on the stores. The study addresses the increasing convergence of business practice across industries; the study of industry-specific effects has a long tradition within the marketing

literature, and the generalizability of the findings of this study will be examined as researchers investigate asymmetric-power relationships in other industrial contexts.

Seventh, this research used single-sided data due to the limited budget. This single-informant method is problematic, since such data limits the ability to triangulate findings (Dahlstrom & Nygaard, 2010).

Eighth, with regard to the finding that information exchange reduces the positive effects of problem-solving negotiation strategy on end-product enhancement outcomes, further research is needed to examine the extent to which the firm's use of information exchange (various types of information), has a negative moderating effect on end-product enhancement outcomes.

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Appendix A: Telephone interview guide

1. If the provided telephone number
    - is disconnected or wrong, tick "**Wrong number**"
    - lead to answering machines, tick "**Answering machine**"
    - lead to person with language difficulties, tick "**Person with language difficulties**"
2. Hello,

   My name is xxx. I am a student at Norwegian School of Economic. I am calling on behalf of Nasun Moadmuang who is also a PhD student at our school. He is now doing a research about relationship between buyer and supplier in oil and gas industry.

   Regarding that, I am interested in talking with a person who is responsible for selling products or services to oil or gas company.
3. Are you the person who is responsible for selling products or service of your company?
    - If no, ask for the right person. Do you know who in your company is responsible for selling your company's products or services? It can be a marketing manager or sales department manager.
        - Note name, job position, and telephone number
        - Call the right person
    - If yes, continue.
4. Do you sell to any oil or gas company?
    - If no, ask for the right person who sells to oil or gas company. Do you know who in your company is responsible for selling to company in oil and gas industry?
        - If there is a right person, note name, job position, and telephone number; and call the right person.
        - If this company does not sell to any oil and gas company, note down that it is not in the industry. They are not informants. Tick "**Out of scope**."
    - If yes, continue.
5. Do you have a minute?
    - If no, ask what time to call back; and call back at that time.
    - If yes, continue.

   I would like to invite you to participate in survey of buyer-seller relationship. The purpose of this project is to find out more how firms can cooperate better and get more out of their relationships.

The survey is an internet-based questionnaire. It consists of many short questions. It has two parts. In general people take 10-15 minutes to complete each part. You do not need to complete all three parts in one time. You can reply to them separately.

Everyone who replies to all questionnaires will receive a report with results from the survey. You will know how to get more from the relationship with your customers. More interestingly, every participant will receive a chance to win an iPad. The expected date of the lucky draw is in August 2012, as all prospective respondents have replied.

So, what I wonder is: would you like to complete this internet-based questionnaire?

- If no, say thank you. Tick "**Refusal**." Ask for reason.
    - You don't have time, do you? If yes, tick "**Lack of time**"
    - You are not interested in any of voluntary research questionnaires, aren't you? If yes, tick "**Not interested in surveys**"
    - Your company is not willing to release the data, isn't it? If yes, tick "**Organizational constraints**"
- If yes, continue.

What I do now is to send you a link to the questionnaire. Then you follow the instructions on the webpage. What is your name and email address?

- Note name:
- Note email address:

Note: If the prospect person hang up as soon as the interviewer has introduced themselves or part-way through the interview, tick "**Refusal**" and "**Hang up**"

Appendix B: Fist email to key informant

Original language: Norwegian

Hei <*name of prospective respondent*>

Viser til hyggelig telefonsamtale nettopp. Tusen takk for at du er positiv til vår undersøkelse!

Her er linken til spørreundersøkelsen vår:

www.nhh.no/oil

Setter stor pris på om du kan svare innen <*date 2 weeks later*>. Alle som deltar er med i trekningen av en iPad.

Vennligst ta kontakt hvis du lurer på noe.

Takk for hjelpen!

Med vennlig hilsen,

<*name of research assistance*>

Forskningsassistent

Norges Handelshøyskole

PS. Kan du gi meg en tilbakemelding på at du har mottatt denne eposten? Takk.

Translated version: English

Dear <*name of prospective respondent*>

Thank you for the nice phone conversation we just had. And thank you for being positive to our research.

Here is the link to our survey:

www.nhh.no/oil

We greatly appreciate it if you can answer within <*date 2 weeks later*>. All who participate will be part of the lucky draw for an iPad.

If there is any question, please do not hesitate to contact us.

Thank you so much for your help.

Best regards,

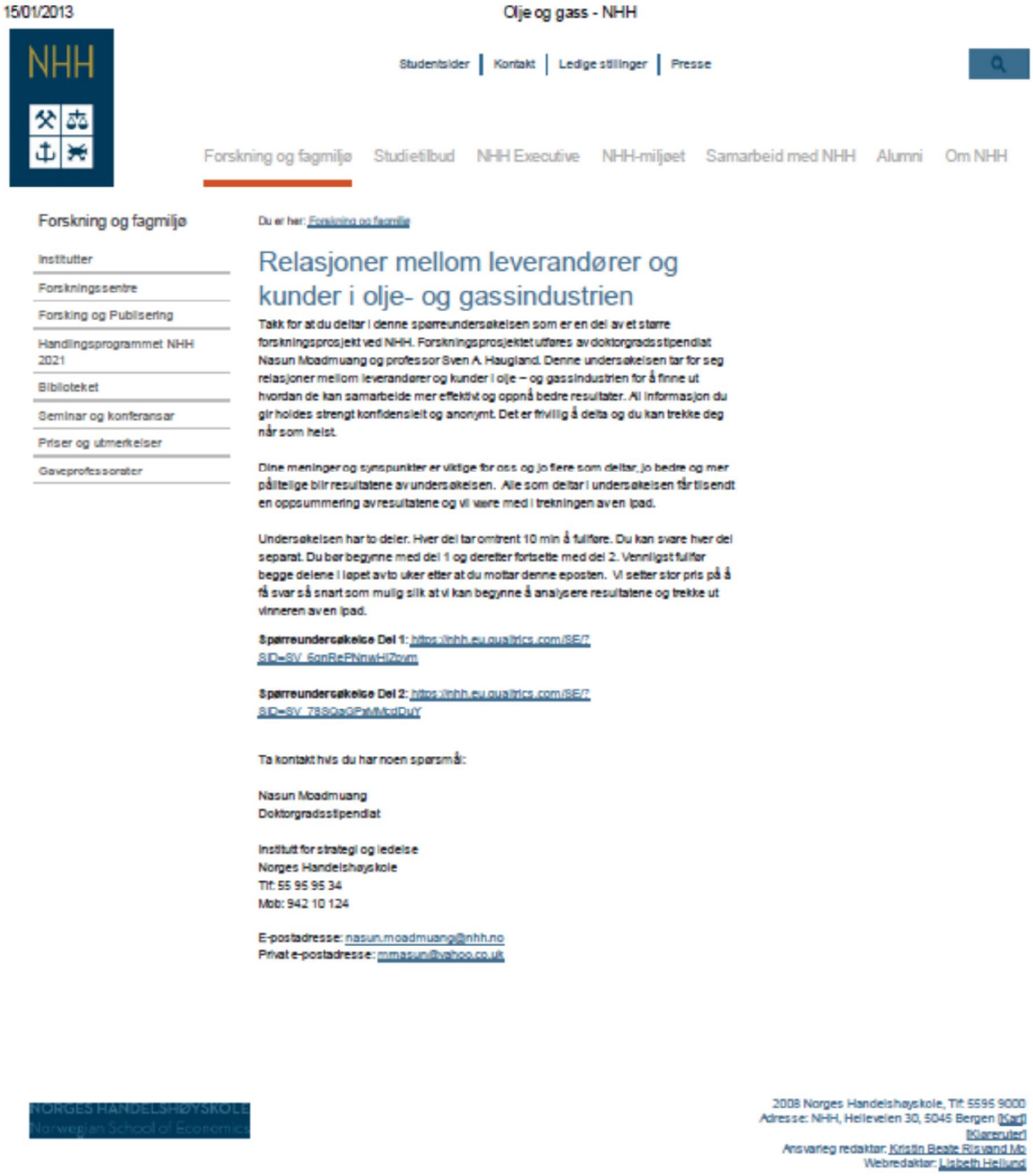
<*name of research assistance*>

Research assistance

Norwegian School of Economics

PS. Can you reply to this email, so that we know that you receive this email? Thank you.

Appendix C: Web page of the study



15/01/2013 Olje og gass - NHH

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- Priser og utmerkelser
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Du er her: Forskning og fagmiljø

Relasjoner mellom leverandører og kunder i olje- og gassindustrien

Takk for at du deltar i denne spørreundersøkelsen som er en del av et større forskningsprosjekt ved NHH. Forskningsprosjektet utføres av doktorgradsstipendiat Nasun Mødmuang og professor Sven A. Haugland. Denne undersøkelsen tar for seg relasjoner mellom leverandører og kunder i olje – og gassindustrien for å finne ut hvordan de kan samarbeide mer effektivt og oppnå bedre resultater. All informasjon du gir holdes strengt konfidensielt og anonymt. Det er frivillig å delta og du kan trekke deg når som helst.

Dine meninger og synspunkter er viktige for oss og jo flere som deltar, jo bedre og mer pålitelige blir resultatene av undersøkelsen. Alle som deltar i undersøkelsen får tilsendt en oppsummering av resultatene og vil være med i trekningen av en Ipad.

Undersøkelsen har to deler. Hver del tar omtrent 10 min å fullføre. Du kan svare hver del separat. Du bør begynne med del 1 og deretter fortsette med del 2. Vennligst fullfør begge delene i løpet av to uker etter at du mottar denne eposten. Vi setter stor pris på å få svar så snart som mulig slik at vi kan begynne å analysere resultatene og trekke ut vinneren av en Ipad.

Spørreundersøkelse Del 1: https://nhh.eu.qualtrics.com/SE/?SID=SV_6qnRcPNnwHIZnvm

Spørreundersøkelse Del 2: https://nhh.eu.qualtrics.com/SE/?SID=SV_78SQp0PwMMcdDuY

Ta kontakt hvis du har noen spørsmål:

Nasun Mødmuang
Doktorgradsstipendiat

Institutt for strategi og ledelse
Norges Handelshøyskole
Tlf: 55 95 95 34
Mob: 942 10 124

E-postadresse: nasun.moadmuang@nhh.no
Privat e-postadresse: mmasun@yahoo.co.uk

NORGES HANDELSHØYSKOLE
Norwegian School of Economics

Appendix D: Questionnaire

Block 1

Del 1: Spørsmål om et bestemt kundeforhold

Vi ber om at du besvarer følgende spørsmål ved å ta utgangspunkt i relasjonen til en av bedriftens kunder.
Velg en kunde som du bruker mye tid på og et produkt/tjeneste som er viktig for din bedrift og som du selger til denne kunden. Kunden må være innenfor **olje- og gassnæringen** og samarbeidet må være **pågående**.
Kunden **må ikke** være en del av samme selskap som din bedrift, eller eies av eller eie din bedrift, men det må være en ekstern kunde. Når du senere skal besvare del 2 av spørreskjemaet, skal du **bruke samme** kunde og samme produkt/tjeneste. Svarene dine er **konfidensielle**.

1. Hva er din e-postadresse? (E-postadressen er nødvendig for å kunne koble sammen del 1 og 2 av spørreskjemaet. Det er viktig at vi får oppgitt den korrekte e-postadressen slik at vi kan sende deg resultatene av undersøkelsen og kontakte deg hvis du vinner trekningen av en Ipad.)

Din e-postadresse

2. Oppgi ca. antall personer som på det meste er involvert i dette kundeforholdet.

I din bedrift (antall personer)

og hos kunden (antall personer)

3. Kan du estimere verdien av leveransene av dette produktet/tjenesten til kunden?

Skriv beløpet i millioner kroner. For eksempel, hvis verdien er 500 000 kroner, skriv "0.5" , og hvis verdien er 100 million kroner, skriv "100".

4. Når begynte samarbeidet og når forventes det å avslutte?

Når begynte samarbeidet: ca.(åååå)

Når forventes det at samarbeidet avsluttes: ca.(åååå)

5. Velg et av følgende alternativer som best beskriver samarbeidet mellom kunden og din bedrift:

- Fastpriskontrakt
- Fastpriskontrakt med insentivbestemmelser (bonus i forhold til målsatte krav vedrørende kostnader, tid og/eller ytelser)
- Kostnadskontrakt med insentivbestemmelser (fortjenesten er variabel avhengig om de realiserte kostnadene er lavere eller høyere enn forventet)
- Kostnadskontrakt med fast fortjeneste/margin

Block 2

Spørsmålene som følger er formulert som påstander med svaralternativer som varierer fra "I svært liten grad" til "I svært stor grad". Du svarer ved å velge tallet som best gjenspeiler hvor beskrivende påstanden er for din bedrift.

I dette spørsmålet rettes oppmerksomheten mot ulike forhold vedrørende relasjonen og kontrakten mellom din bedrift og denne kunden.

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
6. Relevante risikoelementer er inkludert i kontrakten.	○	○	○	○	○	○	○
7. Kontrakten ble utformet med utgangspunkt i tidligere kontrakter eller standardkontrakter.	○	○	○	○	○	○	○
8. Vi og kunden har lagt ned mye ressurser i å utforme effektive kontrakter.	○	○	○	○	○	○	○
9. Ansatte fra ulike funksjoner eller eksterne personer har bidratt til å utforme kontrakten basert på den ekspertisen de har.	○	○	○	○	○	○	○
10. De som har vært involverte i kontraktutformingen er klar over hvilke avveininger som må gjøres i relasjon til forskjellige kontraktsbestemmelser.	○	○	○	○	○	○	○
11. Kunden retter oppmerksomheten mot konkurrerende tilbud fra andre leverandører for å få oss til å arbeide mer effektivt.	○	○	○	○	○	○	○
12. Kunden overvåker markedet kontinuerlig for å sikre seg at våre priser ikke er vesentlig høyere enn hva andre leverandører i markedet kan tilby.	○	○	○	○	○	○	○
13. Kunden vil bytte til en annen leverandør dersom denne leverandøren kan levere varer/tjenester til lavere pris enn hva vår bedrift kan tilby.	○	○	○	○	○	○	○
14. Det er utviklet regler og retningslinjer for de fleste forhold i dette samarbeidet.	○	○	○	○	○	○	○
15. Hvordan den daglige styringen av samarbeidet skal foregå er uttrykt i en skriftlig avtale.	○	○	○	○	○	○	○
16. I den daglige styringen legger begge parter vekt på å følge de gjeldende regler og retningslinjer.	○	○	○	○	○	○	○
17. Vi legger vekt på å opptre formelt riktig i forhold til avtalen.	○	○	○	○	○	○	○
18. Kontrakten beskriver nøyaktig hvordan uenigheter mellom partene skal håndteres.	○	○	○	○	○	○	○
19. Betingelsene for samarbeidet blir fullt ut bestemt av en av partene, enten av vår bedrift eller kunden.	○	○	○	○	○	○	○
20. Pågående endringer i samarbeidet blir fullt ut bestemt av en av partene, enten vår bedrift eller kunden.	○	○	○	○	○	○	○
21. Underleverandør/kontraktører blir valgt av en av partene, enten av vår bedrift eller kunden.	○	○	○	○	○	○	○
22. Retningslinjer og prosedyrer for kvalitetskontroll i samarbeidet blir fullt ut bestemt av en av partene, enten av vår bedrift eller kunden.	○	○	○	○	○	○	○

Block 3

Påstandene som følger nedenfor dreier seg om hvordan din bedrift og den valgte kunden forholder seg til hverandre.

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
23. Begge parter er innstilt på å være fleksible for å imøtekomme ønsker om endringer fra partneren på kort varsel.							
24. Begge parter er innstilt på å kunne endre tidligere avtaler dersom en av partene ber om det.							
25. Når noe uforutsett skjer, vil begge parter heller utarbeide en ny avtale enn tvinge hverandre til å overholde betingelsene i den gamle.							
26. Begge parter ser det som viktig at det gjøres forbedringer som gagner samarbeidet som helhet og ikke bare en av oss.							
27. Begge parter har ikke noe imot å skylde hverandre tjenester.							
28. Begge parter behandlet problemer som oppstår i denne relasjonen som et felles ansvar og ikke bare som et individuelt ansvar.							
29. Samarbeidet mellom partene kan bedre beskrives som et samarbeidspreget forhold enn en "avstandspreget forhandling".							
30. I dette samarbeidet forventes det at informasjon som kan gagne den andre parten vil bli formidlet til den.							
31. I dette samarbeidet skjer utveksling av informasjon uformelt.							
32. Det forventes at begge parter holder hverandre informert om hendelser eller endringer som kan ha betydning for den andre parten.							
33. Utveksling av informasjon skjer ofte i dette samarbeidet.							
34. Det forventes at partene vil gi sensitiv eller fortrolig informasjon hvis det kan hjelpe den andre parten.							
35. Vår bedrift eller kunden vil ikke utnytte en dominerende forhandlingsposisjon.							
36. Det forventes at partneren med størst makt og forhandlingsstyrke ikke utnytter sin posisjon for å presse gjennom egne krav.							
37. Det forventes at begge parter bør begrense bruk av den makt og forhandlingsstyrke de har over den andre parten.							

Block 4

I dette spørsmålet vil vi se nærmere på usikkerhet i markedet og forventninger til fremtiden.

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
38. Etterspørselen i dette markedet er vanskelig å forutsi.							
39. Salget vårt i dette markedet er vanskelig å forutsi.							
40. Konkurransen i dette markedet er vanskelig å forutsi.							
41. Vi har mange års erfaring med denne kunden.							
42. Vi har hatt et meget godt forhold til denne kunden.							
43. Vi forventer fremtidige leveranser til denne kunden.							
44. Vi har bindende avtaler om fremtidige leveranser til denne kunden.							
45. Begge parter tror at dette samarbeidet over lang tid vil være lønnsomt.							
46. Begge parter anser det som viktig å opprettholde et langsiktig samarbeid.							
47. Eventuelle innrømmelser som gis av en av partene for å hjelpe den andre vil bli gjengjeldt i fremtiden							
48. Begge parter fokuserer på langsiktige mål i dette samarbeidet.							
49. Begge parter forventer å arbeide sammen i lang tid framover.							

Dette spørsmålet fokuserer på egenskaper ved de produkter/tjenester som leveres til kunden.

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
50. Produkter/tjenester som vi leverer til kunden er høyt spesialiserte.							
51. Vår bedrift investerer mye for å legge til rette for å kunne levere disse produktene/tjenestene til kunden.							
52. Denne kunden investerer mye for å legge til rette for å kunne kjøpe disse produktene/tjenestene fra oss.							

53. I dette spørsmålet ser vi på avhengighet mellom din bedrift og kunden. Vennligst velg en av kategoriene nedenfor.

- Vår bedrift er mer avhengig av denne kunden enn omvendt.
- Denne kunden er mer avhengig av oss enn omvendt.
- Vår bedrift og denne kunden er like avhengige av hverandre.
- Vår bedrift er ikke avhengig av denne kunden og denne kunden er heller ikke avhengig av oss.

Block 5

I de to følgende spørsmålene ser vi på hvordan din bedrift og kunden påvirker hverandre på ulike områder. Først ser vi på hvordan din bedrift har påvirket kunden og deretter hvordan kunden har påvirket din bedrift.

Vår bedrift har påvirket denne kunden til å endre strategi og praksis når det gjelder...

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
54. ... forskning og utvikling							
55. ... innkjøp							
56. ... produkter eller teknologi							
57. ... produksjonsprosess / teknologi							
58. ... markedsføring							
59. ... distribusjon							

Denne kunden har påvirket oss til å endre strategi og praksis når det gjelder...

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
60. ... forskning og utvikling utvikling							
61. ... salg							
62. ... produkter eller teknologi							
63. ... produksjonsprosess / teknologi							
64. ... markedsføring							
65. ... distribusjon							

I det følgende spørsmålet ser vi på hvilke konsekvenser det vil få for din kunde dersom relasjonen avsluttes.

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
66. Hvis vi slutter å levere til denne kunden, så vil det være vanskelig for kunden å finne alternative leverandører.							
67. Hvis vi slutter å levere til denne kunden, så vil kunden få økonomiske problemer.							
68. Kunden er avhengig av oss.							
69. Det finnes ikke andre tilsvarende leverandører som kan erstatte oss.							

I det følgende spørsmålet ser vi på hvilke konsekvenser det vil få for din bedrift dersom relasjonen avsluttes.

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
70. Hvis denne kunden slutter å kjøpe fra oss, vil det bli vanskelig for oss å finne alternative kunder.							
71. Hvis denne kunden slutter å kjøpe fra oss, vil vi få økonomiske problemer.							
72. Vår bedrift er avhengig av denne kunden.							
73. Det finnes ikke andre tilsvarende kunder som kan erstatte denne kunden.							

Block 1

Del 2 Spørsmål om kommunikasjon med kunden

Ved besvarelse av denne delen av spørreskjemaet vil vi at du velger **samme kunde** som du valgte ved besvarelse av første del av spørreskjemaet. Alle spørsmål skal besvares i relasjon til denne kunden. De fleste spørsmålene er formulert som påstander med svaralternativer som varierer fra veldig uenig til veldig enig, i liten grad til svært stor grad, eller aldri til veldig ofte. Du svarer ved å velge tallet som best gjenspeiler hvor beskrivende påstanden er for din bedrift. Svarene dine er **konfidensielle**.

1. Hva er din e-postadresse? (Vennligst bruk samme e-postadresse som du har brukt tidligere)

Din e-postadresse

I dette spørsmålet ser vi nærmere på hvordan din bedrift og kunden kommuniserer og interagerer med hverandre.

Både vi og kunden....

	Veldig uenig 1	2	3	4	5	6	Veldig enig 7
2. ... forsøker å få til åpen diskusjoner av problemer med hverandre	○	○	○	○	○	○	○
3. ... prøver å vise hverandre grunnlaget for og fordelene ved hverandres forhandlingsposisjoner	○	○	○	○	○	○	○
4. ... kommuniserer klart våre egne prioriteringer til hverandre	○	○	○	○	○	○	○
5. ... forsøker å få fram alle saker og utfordringer	○	○	○	○	○	○	○
6. ... forteller om egne ideer og spør etter den annen parts ideer	○	○	○	○	○	○	○
7. ... deler problemer med hverandre slik at vi kan løse de sammen	○	○	○	○	○	○	○
8. ... er tydelige på våre respektive krav	○	○	○	○	○	○	○
9. ... presser på for å få vår vilje gjennom	○	○	○	○	○	○	○
10. ... er gjennom forhandlingene med hverandre forpliktet til å følge de opprinnelige krav og standpunkt.	○	○	○	○	○	○	○
11. ... prøver å få gjennomslag for våre respektive krav	○	○	○	○	○	○	○
12. ... truer med å avslutte forhandlingene med hverandre	○	○	○	○	○	○	○
13. ... indikerer at vi egentlig skulle ha ønsket å forhandle med en annen part	○	○	○	○	○	○	○
14. ... setter frem indirekte trusler til hverandre	○	○	○	○	○	○	○
15. ... uttrykker misnøye med hverandres oppførsel	○	○	○	○	○	○	○

Block 2

I dette spørsmålet ser vi på ulike måter kunden kommuniserer med din bedrift for å påvirke din bedrifts handlinger eller få din bedrift til å endre prosedyrer.

Når denne kunden prøver å påvirke oss ....

	Aldri 1	2	3	4	5	6	Veldig ofte 7
16. .... gir de oss detaljert informasjon om en rekke forhold rundt egen bedrift	○	○	○	○	○	○	○
17. .... er de opptatt av å diskutere langsiktig planlegging, mer enn dagilge aktiviteter	○	○	○	○	○	○	○
18. .... trekker de frem hvordan deres beslutninger påvirker "det store bildet"	○	○	○	○	○	○	○
19. .... gjør de det klart at det vil være til fordel for vår bedrift å følge deres anbefalinger	○	○	○	○	○	○	○
20. .... gjør de det klart at henslikten er til det beste for et godt samarbeid	○	○	○	○	○	○	○
21. .... forteller de om deres egen logikk og gir oss bevis for hvorfor vi bør kunne forvente suksess	○	○	○	○	○	○	○
22. .... ber de oss akseptere krav, uten å henvise til positive eller negative utfall for vår bedrift som er betinget av vår aksept	○	○	○	○	○	○	○
23. .... ber de oss godta nye ideer uten noen forklaring på hvilken effekt det vil ha for vår bedrift	○	○	○	○	○	○	○
24. .... ber de om samarbeid for å implementere nye systemer og løsninger uten å nevne belønninger for å akseptere kravene eller straff for ikke å akseptere kravene	○	○	○	○	○	○	○
25. .... indikerer de at det vil få negative konsekvenser hvis vi ikke aksepterer deres krav	○	○	○	○	○	○	○
26. .... truer de med å trekke tilbake fordeler de har gitt oss hvis vi ikke aksepterer deres krav	○	○	○	○	○	○	○
27. .... sier de at vår bedrift vil miste status som den foretrukne leverandøren hvis vi ikke aksepterer deres krav	○	○	○	○	○	○	○
28. .... tilbyr de insentiver for at vi skal akseptere deres krav	○	○	○	○	○	○	○
29. .... lover de oss belønning dersom vi samarbeider	○	○	○	○	○	○	○
30. .... indikerer de hvordan de vil belønne oss dersom vi samtykker i deres krav	○	○	○	○	○	○	○
31. .... påpeker de at den juridiske avtalen enten foreslår eller krever at kravene følges	○	○	○	○	○	○	○
32. .... henviser de til det som er avtalt i kontrakten	○	○	○	○	○	○	○
33. .... indikerer de at vår bedrift er bundet til kontrakten	○	○	○	○	○	○	○

Block 3

Dette spørsmålet ser på hvilke resultater din bedrift har oppnådd gjennom samarbeidet med kunden.

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
34. Dette samarbeidet har gjort oss i stand til å redusere våre kostnader	○	○	○	○	○	○	○
35. Våre rutiner og prosedyrer har over tid blitt mer effektive på grunn av dette samarbeidet	○	○	○	○	○	○	○
36. Gjennom dette samarbeidet har vi fått til koordinering av aktiviteter med kunden som er mer effektiv enn med andre kunder	○	○	○	○	○	○	○
37. På grunn av dette samarbeidet har vi vært i stand til å realisere kostnadsbesparelser gjennom implementering av effektive systemer og metoder	○	○	○	○	○	○	○
38. Dette samarbeidet har gjort oss bedre i stand til å møte oppganger og nedganger i markedet.	○	○	○	○	○	○	○
39. Dette samarbeidet har bidratt til å øke vårt salg.	○	○	○	○	○	○	○
40. Samarbeidet med denne bedriften har hatt positiv innvirkning på markedets oppfatning av våre produkter og tjenester.	○	○	○	○	○	○	○
41. På grunn av dette samarbeidet har imaget av våre produkter og tjenester i markedet blitt betydelig styrket.styrket.	○	○	○	○	○	○	○
42. Dette samarbeidet har gjort oss i stand til å gjøre våre produkter og tjenester positivt forskjellige (differensierte) fra våre konkurrenter.	○	○	○	○	○	○	○
43. Dette samarbeidet har ført til at vår bedrift er bedre i stand til å tilpasse våre produkter og tjenester til kundens produkter og tjenester med hensyn til produktutforming og tekniske løsninger.	○	○	○	○	○	○	○
44. Vårt samarbeid med denne bedriften har vært en suksess.	○	○	○	○	○	○	○
45. Vårt samarbeid med denne bedriften har overgått våre forventninger.	○	○	○	○	○	○	○
46. Vi er tilfredse med resultatene av dette samarbeidet.	○	○	○	○	○	○	○

Block 4

Påstandene nedenfor dreier seg om samarbeidstiltak og tilpasninger som din bedrift har gjennomført i relasjon til kunden.

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
47. Vi har brukt betydelige ressurser på å tilpasse egen organisasjon for å kunne arbeide med denne kunden.	○	○	○	○	○	○	○
48. Vi har brukt betydelige ressurser på opplæring av ansatte som skal arbeide med denne kunden.	○	○	○	○	○	○	○
49. I vår relasjon til kunden har vi gjennomført betydelige investeringer i utstyr og/eller anlegg.	○	○	○	○	○	○	○
50. Vi har gjennomført betydelige tilpasninger av produkter og tjenester for å møte kundens krav.	○	○	○	○	○	○	○
51. Vi har gjort flere justeringer for å tilpasse oss kundens teknologiske standarder.	○	○	○	○	○	○	○
52. Vår bedrift har tilegnet seg kompetanse som har begrenset verdi for oss hvis samarbeidet med denne kunden avsluttes.	○	○	○	○	○	○	○
53. Vår bedrift har brukt mye tid og ressurser på å utvikle forholdet til denne kunden.	○	○	○	○	○	○	○
54. Vi vil lide et betydelig økonomisk tap dersom samarbeidet med denne kunden avsluttes.	○	○	○	○	○	○	○

Påstandene nedenfor dreiser seg om samarbeidstiltak og tilpasninger som kunden har gjennomført i relasjon til din bedrift.

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
55. Kunden har brukt betydelige ressurser på å tilpasse egen organisasjon for å kunne arbeide med vår bedrift.	○	○	○	○	○	○	○
56. Kunden har brukt betydelige ressurser på opplæring av ansatte som skal arbeide med oss.	○	○	○	○	○	○	○
57. Kunden har i relasjon til vår bedrift gjennomført betydelige investeringer i utstyr og/eller anlegg.	○	○	○	○	○	○	○
58. Kunden har gjennomført betydelige tilpasninger av produkter og tjenester for å møte våre krav.	○	○	○	○	○	○	○
59. Kunden har gjort flere justeringer for å tilpasse seg våre teknologiske standarder.	○	○	○	○	○	○	○
60. Kunden har tilegnet seg kompetanse som har begrenset verdi for deres bedrift hvis samarbeidet med oss avsluttes.	○	○	○	○	○	○	○
61. Kunden har brukt mye tid og ressurser på å utvikle forholdet til oss.	○	○	○	○	○	○	○
62. Kunden vil lide et betydelig økonomisk tap dersom samarbeidet med oss avsluttes.	○	○	○	○	○	○	○

Block 5

Dette spørsmålet tar for seg problemer som kan oppstå i kundeforholdet.

	I svært liten grad 1	2	3	4	5	6	I svært stor grad 7
63. Til tider fellinformerer denne kunden oss om ting for å beskytte eller fremme egne interesser.	○	○	○	○	○	○	○
64. Denne kunden lover noen ganger å gjøre ting uten faktisk å følge dette opp senere.	○	○	○	○	○	○	○
65. Denne kunden handler ikke alltid i tråd med kontrakten eller avtalene mellom oss.	○	○	○	○	○	○	○
66. Denne kunden prøver noen ganger å bryte uformelle avtaler for å fremme egne interesser.	○	○	○	○	○	○	○
67. Denne kunden prøver å dra fordel av "hull" i kontrakten for å fremme egne interesser.	○	○	○	○	○	○	○
68. Denne kunden utnytter noen ganger uventede hendelser for å oppnå bedre betingelser på vår bekostning.	○	○	○	○	○	○	○

Appendix E: Descriptive statistics of the sample, N=198

Table E.1 Descriptive statistics of the sample, N=198

	Mean	S.D	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
Dependent variables						
Hierarchical governance						
Formalization						
FORM1	5.22	1.378	-0.806	0.173	0.281	0.344
FORM2	4.71	1.731	-0.567	0.173	-0.608	0.344
FORM3	5.57	1.260	-1.085	0.173	1.176	0.344
FORM4	6.13	1.056	-1.847	0.173	**4.603**	0.344
FORM5	5.37	1.646	-0.944	0.173	0.048	0.344
Centralization						
CENT1	4.49	1.762	-0.405	0.173	-0.847	0.344
CENT2	4.56	1.660	-0.420	0.173	-0.825	0.344
CENT3	5.21	1.846	-1.030	0.173	-0.044	0.344
CENT4	5.16	1.701	-0.779	0.173	-0.400	0.344
Relational governance						
Flexibility						
FLEX1	5.34	1.478	-0.895	0.173	0.132	0.344
FLEX2	4.32	1.684	-0.267	0.173	-0.876	0.344
FLEX3	4.07	1.826	-0.227	0.173	-1.129	0.344
Solidarity						
SOL1	5.41	1.329	-0.940	0.173	0.373	0.344
SOL2	3.59	1.754	0.112	0.173	-1.020	0.344
SOL3	4.99	1.398	-0.779	0.173	0.298	0.344
SOL4	5.05	1.575	-0.747	0.173	-0.208	0.344
Information exchange						
INF1	5.64	1.233	-1.126	0.173	1.201	0.344
INF2	4.41	1.836	-0.379	0.173	-1.046	0.344
INF3	6.01	1.032	-1.390	0.173	2.122	0.344
INF4	5.58	1.184	-1.158	0.173	1.737	0.344
INF5	3.86	1.914	-0.071	0.173	-1.340	0.344
Restraint in the use of Power						
RPW1	4.06	1.690	-0.216	0.173	-0.890	0.344
RPW2	4.47	1.770	-0.513	0.173	-0.767	0.344
RPW3	4.68	1.563	-0.586	0.173	-0.201	0.344
Cost reduction outcomes						
CRO1	3.25	1.560	-0.071	0.173	-1.137	0.344
CRO2	4.27	1.611	-0.569	0.173	-0.502	0.344
CRO3	4.30	1.524	-0.619	0.173	-0.317	0.344
CRO4	3.56	1.651	0.015	0.173	-1.021	0.344
CRO5	4.17	1.670	-0.247	0.173	-0.834	0.344
End product enhancement outcomes						
EPE1	5.28	1.411	-1.061	0.173	0.900	0.344
EPE2	5.35	1.362	-1.296	0.173	1.970	0.344
EPE3	5.12	1.418	-0.779	0.173	0.404	0.344
EPE4	4.55	1.611	-0.587	0.173	-0.490	0.344
EPE5	4.38	1.584	-0.402	0.173	-0.734	0.344
Satisfaction with the collaboration						
SAT1	5.71	1.215	-1.169	0.173	1.187	0.344
SAT2	4.63	1.485	-0.559	0.173	-0.005	0.344
SAT3	5.51	1.289	-1.207	0.173	1.513	0.344

	Mean	S.D	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
Independent variables						
Supplying firm's specific investments						
SSI1	4.58	1.702	-0.578	0.173	-0.543	0.344
SSI2	4.41	1.628	-0.417	0.173	-0.693	0.344
SSI3	4.04	1.756	-0.142	0.173	-0.946	0.344
SSI4	4.36	1.670	-0.371	0.173	-0.749	0.344
SSI5	4.30	1.605	-0.429	0.173	-0.657	0.344
SSI6	2.97	1.675	0.564	0.173	-0.828	0.344
SSI7	5.11	1.456	-0.993	0.173	0.568	0.344
SSI8	3.99	1.858	-0.129	0.173	-1.127	0.344
Buying firm's specific investments						
BSI1	2.56	1.472	0.946	0.173	0.220	0.344
BSI2	2.49	1.463	1.003	0.173	0.254	0.344
BSI3	2.25	1.530	1.335	0.173	0.986	0.344
BSI4	2.08	1.260	1.277	0.173	1.358	0.344
BSI5	2.44	1.469	0.936	0.173	0.051	0.344
BSI6	2.30	1.316	1.013	0.173	0.317	0.344
BSI7	3.25	1.448	0.310	0.173	-0.793	0.344
BSI8	2.27	1.441	1.209	0.173	0.798	0.344
Problem-solving negotiation strategy						
PSV1	5.81	0.993	-0.749	0.173	0.217	0.344
PSV2	4.96	1.300	-0.761	0.173	0.315	0.344
PSV3	5.15	1.011	-0.577	0.173	0.420	0.344
PSV4	5.54	1.064	-0.885	0.173	1.059	0.344
PSV5	5.32	1.280	-0.996	0.173	1.424	0.344
PSV6	5.20	1.242	-0.792	0.173	0.244	0.344
Aggressive negotiation strategy						
AGG1	5.38	1.064	-0.613	0.173	0.617	0.344
AGG2	3.82	1.387	-0.164	0.173	-0.547	0.344
AGG3	4.90	1.320	-0.491	0.173	-0.064	0.344
AGG4	5.13	1.248	-0.949	0.173	1.178	0.344
AGG5	1.90	1.266	2.085	0.173	**4.660**	0.344
AGG6	1.63	0.961	2.252	0.173	**7.002**	0.344
AGG7	1.56	1.082	2.694	0.173	**8.260**	0.344
AGG8	1.84	1.215	1.703	0.173	**2.658**	0.344

	Mean	S.D	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
Control variables						
Environmental uncertainty						
UNC1	4.07	1.626	0.064	0.173	-1.143	0.344
UNC2	4.23	1.547	0.129	0.173	-0.927	0.344
UNC3	3.66	1.578	0.259	0.173	-0.706	0.344
Opportunism						
OPP1	1.98	1.321	1.571	0.173	1.906	0.344
OPP2	2.77	1.629	0.856	0.173	-0.143	0.344
OPP3	2.52	1.537	1.038	0.173	0.291	0.344
OPP4	2.16	1.513	1.384	0.173	0.992	0.344
OPP5	2.30	1.677	1.346	0.173	0.705	0.344
OPP6	2.24	1.504	1.288	0.173	0.998	0.344
Market governance						
MKT1	4.65	1.691	-0.500	0.173	-0.619	0.344
MKT2	4.98	1.637	-0.795	0.173	-0.132	0.344
MKT3	3.94	1.716	0.257	0.173	-0.831	0.344
Importance						
IMP1	3.73	1.815	1.263	0.173	1.239	0.344
IMP2	3.09	2.115	0.306	0.173	0.220	0.344
Past experience						
PAST1	5.90	1.609	-1.600	0.173	1.633	0.344
PAST2	6.14	1.033	-1.601	0.173	**3.192**	0.344
Future expectations						
FUT1	6.34	0.874	-1.733	0.173	**3.964**	0.344
FUT2	4.45	2.373	-0.383	0.173	-1.470	0.344
Product/service characteristics						
PCHA1	5.99	1.192	-1.433	0.173	2.106	0.344
PCHA2	5.93	1.169	-1.577	0.173	**3.462**	0.344
PCHA3	4.03	1.684	-0.085	0.173	-0.892	0.344
Contract design capability						
CDC1	4.56	1.657	-0.525	0.173	-0.503	0.344
CDC2	5.36	1.551	-1.219	0.173	1.073	0.344
CDC3	4.48	1.595	-0.455	0.173	-0.500	0.344
CDC4	4.28	1.957	-0.430	0.173	-1.095	0.344
CDC5	5.13	1.440	-0.830	0.173	0.194	0.344

Appendix F: Assessment of model fit

- *The model χ^2 statistic* which is the original fit index for structural model. It assesses the magnitude of the difference between the sample and the model estimated variance/covariance matrices. When we use this statistic, we expect a non-significant χ^2. In other words, we expect not to reject the null hypothesis which is that there is no difference between the two mentioned matrices. In this study the χ^2 is an adjusted one, namely Satorra-Bentler χ^2, see Section 6.1.1 for more detail.
- *Comparative fit index* (CFI, Bentler, 1990) compares the specified model with the null model which assumes zero covariances among the observed variables. CFI is defined as the ratio of improvement in moving from the null to specified model. It is an index based on the noncentral χ^2 distribution. It ranges between 0 and 1. Values exceeding 0.90 indicate a good fit.
- *Tucker-Lewis index* (TLI, Tucker & Lewis, 1973) or *non-normed fit index* (NNFI, Bentler & Bonett, 1980) is another way to compare the lack of fit of a specified model to the lack of fit of the null model. Its values can extend outside the range of 0.0 to 1.0. A TLI value less than 0.9 indicates a need to modify the model. Its value close to 1.0 indicates a well-fitting model.
- *Root mean square error of approximation* (RMSEA; Steiger & Lind, 1980) is an absolute index of fit which does not need to compare with a reference model for determining whether the model is improving. Rather, it tells how well the hypothesized model fits the sample data. As RMSEA decreases, the goodness-of-fit improves. Browne and Cudeck (1993) and MacCallum et al. (1996) suggest that values less than 0.05 indicates good fit. Values between 0.05 to 0.08 indicate reasonable fit. Values between 0.08 to 0.10 indicate mediocre fit. Those greater than 0.10 indicate poor fit. In this study, RMSEA is reported with its 90 % confidence interval (CI) around its value. The well-fitting model would give the lower limit close to 0, while upper limit less than 0.08. In addition, this study also reports a close-fit test for null hypothesis where H_0: RMSEA ≤ 0.05. If P is greater than 0.05, then we cannot reject the null hypothesis. This means that the hypothesized model has a "close fit."
- *Standardized Rood mean square residual* (SRMR) is also an absolute index. It is a standard version of the square root of the average residual (RMR). Hu and Bentler (1999) and Kline (2005) suggest that SRMR less than 0.08 is considered a good fit,

while value less than 0.10 is acceptable. It is noteworthy that SRMR is like to be small when sample size and the number of parameters increase (Wang & Wang, 2012)

Appendix G: One-factor model for hierarchical governance

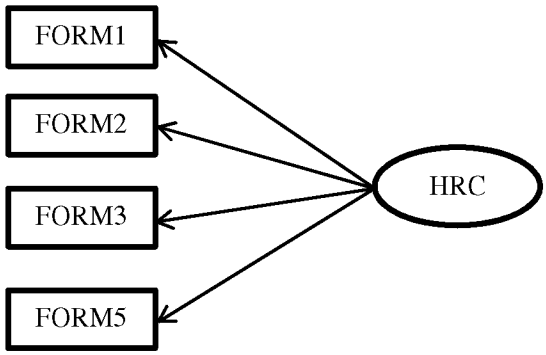

Figure G.1 Final measurement model for one-factor hierarchical governance

Table G.1 One-factor hierarchical governance with robust estimators

	MLM χ^2 (*df*), P-Value	**RMSEA estimate, 90% C.I., Close-fit test *P***	**CFI**	**TLI**	**SRMR**	**Remaining items**	**Deleted items**
M1	145.383(27), 0.0000	0.149, 0.126-0.173, 0.000	0.731	0.642	0.105	FORM1 FORM2 FORM3 FORM4 FORM5 CENT1 CENT2 CENT3 CENT4	
M2	0.249(2), 0.8828	0.000, 0.000-0.068, 0.926	1.000	1.031	0.007	FORM1 FORM2 FORM3 FORM5	FORM4 CENT1 CENT2 CENT3 CENT4

Appendix H: Second-order model for hierarchical governance

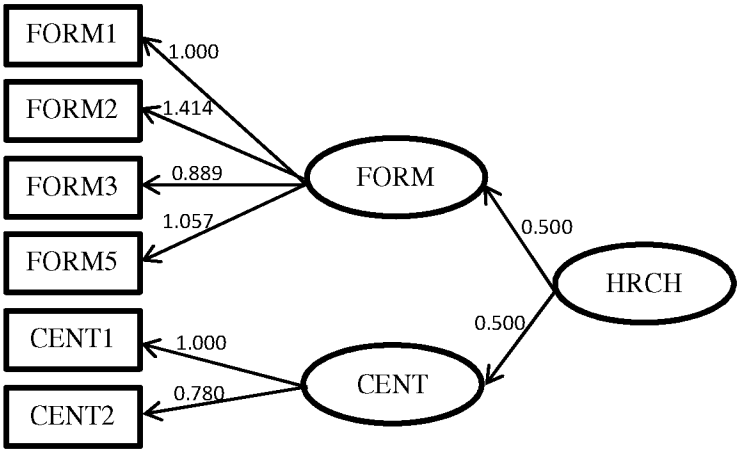

Figure H.1 Final model for second-order CFA model of hierarchical governance
Note: Numbers above the links represents fixed loadings

Table H.1 Second-order measurement model for hierarchical governance with robust estimators

	MLM χ^2 (*df*), P-Value	**RMSEA estimate, 90% C.I., Close-fit test *P***	**CFI**	**TLI**	**SRMR**	**Remaining items**	**Specification**
M1	n/a	n/a	n/a	n/a	n/a	FORM1@1.000 FORM2@1.414 FORM3@0.889 FORM5@1.057 CENT1@1.000 CENT2@0.780	A priori
M2	1.249(12), 1.0000	0.000, 0.000-0.000, 1.000	1.000	1.046	0.011	FORM1@1.000 FORM2@1.414 FORM3@0.889 FORM5@1.057 CENT1@1.000 CENT2@0.780	Fixing FORM and CENT to 0.500.

Appendix I: Measurement model for relational governance

One-factor relational governance measurement model

CFA tested in the present application hypothesises a priori that (a) the relational governance can be explained by one factor, and (b) residuals associated with each item are uncorrelated.

- **Model 1**: All 15 items from the relational governance dimensions (i.e., flexibility: FLEX1-3, solidarity: SOL1-4, information exchange: INF1-5, and restrain in the use of power: RPW1-3) were used in the priori measurement model. All fit indices exhibited poor fit, as presented in Table I.1
- **Model 2**: Respecifying the hypothesized model of relational governance based on the standardized factor-loading values, items with low loading were removed. As a result, the model fit the data better, but at reasonable fit.
- **Model 3**: Since in model 2 there was not any suggestions from model modification indices, and only RPW3 had low factor-loading, it was removed in model 3. The model results showed deterioration. Therefore, model2 was chosen to be the final model for single-factor relational contract. A diagrammatic representation of this final measurement model is presented in Figure I.1.

Table I.1 One-factor relational governance with robust estimators

	MLM χ^2 (*df*), P-Value	RMSEA estimate, 90% C.I., Close-fit test *P*	CFI	TLI	SRMR	Remaining items	Deleted items
M1	400.329(90), 0.0000	0.132, 0.119-0.145, 0.000	0.690	0.639	0.095	FLEX1 FLEX2 FLEX3 SOL1 SOL2 SOL3 SOL4 INF1 INF2 INF3 INF4 INF5 RPW1 RPW2 RPW3	
M2	15.249(9), 0.0843	0.059, 0.000-0.109, 0.335	0.983	0.971	0.029	FLEX1 SOL1 SOL3 SOL4 INF1 RPW3	FLEX2 FLEX3 SOL2 INF2 INF3 INF4 INF5 RPW1 RPW2
M3	12.864(5), 0.0247	0.089, 0.029-0.151, 0.118	0.976	0.953	0.028	FLEX1 SOL1 SOL3 SOL4 INF1	FLEX2 FLEX3 SOL2 INF2 INF3 INF4 INF5 RPW1 RPW2 RPW3

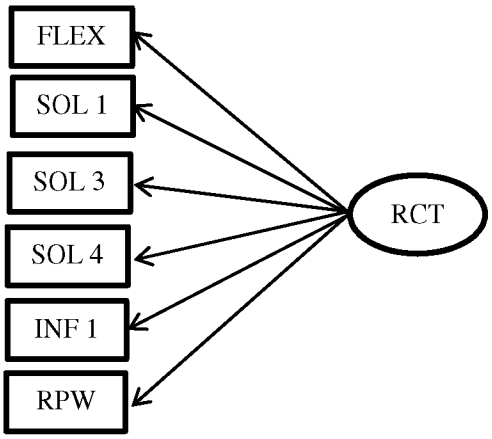

Figure I.1 Final measurement model for one-factor relational governance

Four-factor relational governance measurement model

CFA model tested in the present application postulates a priori that (a) relational governance is four-factor structure composed of flexibility (FLEX), solidarity (SOL), information exchange (INF), and restraint to the use of power (RPW); (b) each item-pair measure has a nonzero loading on factor that it was designed to measure and zero loading on all other factors; (c) the four relational governance factors, consistent with the theory, are correlated; and (d) residual errors associated with each measure are uncorrelated.

- **Model 1**: The a priori CFA model exhibited mediocre fit, see Table I.2.
- **Model 2**: Respecifying the model based on the standardized factor-loading values, items with the low loading values were removed. The model results showed that some indices became better (i.e., CFI, TLI, and SRMR), but some became worse (i.e., RMSEA).
- **Model 3:** Respecifying the model based on the model modification indices, high cross loading items were removed. The model results showed good fit.
- **Model 4:** Respecifying the model by removing the item that had high correlation with other items. The model results showed perfect fit. Since all loadings were greater than the 0.6 cut-off point and no suggestion in model modification indices, model 4 was chosen to be the final model for four-factor relational contract.
- **Model 5:** Respecifying the model by fixing the loadings to the un-standardized estimates acquired in model 4. This is to make a model that can be compared with second-order relational contract in next application. The final model is presented schematically in Figure I.2. The model results became slightly better.

Table I.2 Four-factor CFA for relational governance with robust estimators
Note: In model 5, loadings were fixed as the values behind @ sign

	MLM χ^2 (*df*), P-Value	**RMSEA estimate, 90% C.I., Close-fit test *P***	**CFI**	**TLI**	**SRMR**	**Remaining items**	**Specification**
M1	212.322(84), 0.0000	0.088, 0.073-0.103, 0.000	0.872	0.840	0.078	FLEX1 FLEX2 FLEX3 SOL1 SOL2 SOL3 SOL4 INF1 INF2 INF3 INF4 INF5 RPW1 RPW2 RPW3	
M2	97.213(38), 0.0000	0.089, 0.067-0.111, 0.002	0.925	0.891	0.058	FLEX1 FLEX2 FLEX3 SOL1 SOL3 SOL4 INF1 INF3 INF4 RPW2 RPW3	SOL2 INF2 INF5 RPW1 were removed.
M3	25.926(21), 0.2093	0.034, 0.000-0.073, 0.706	0.991	0.984	0.033	FLEX2 FLEX3 SOL1 SOL3 SOL4 INF3 INF4 RPW2 RPW3	SOL2 INF2 INF5 RPW1 FLEX1 INF1 were removed.
M4	10.514(14), 0.7237	0.000, 0.000-0.052, 0.944	1.000	1.016	0.025	FLEX2 FLEX3 SOL3 SOL4 INF3 INF4 RPW2 RPW3	SOL2 INF2 INF5 RPW1 FLEX1 INF1 SOL1 were removed.
M5	10.135(18), 0.9274	0.000, 0.000-0.020, 0.994	1.000	1.028	0.025	FLEX2@1.000 FLEX3@0.893 SOL3@1.000 SOL4@1.337 INF3@1.000 INF4@1.041 RPW2@1.000 RPW3@1.006	SOL2 INF2 INF5 RPW1 FLEX1 INF1 SOL1 were removed. Loadings were fixed to un-standardized estimates in model4.

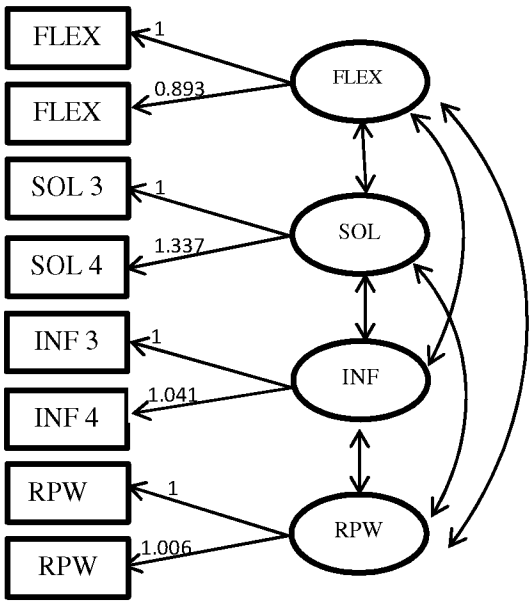

Figure I.2 Final four-factor CFA model of relational governance
Note: Numbers above the links represents fixed loadings.

Second-order measurement model for relational governance

The CFA model here hypothesizes a priori that (a) the relational governance can be explained by four first-order factors (flexibility: FLEX, solidarity: SOL, information exchange: INF, and restraint to the use of power: RPW) and one second-order factor (relational governance: RCT); (b) each item has a nonzero loading on the first-order factor it was designed to measure, and zero loadings on the other three first-order factors; (c) all factor loadings are fixed to be the un-standardized factor loadings acquired from four-factor model, This enables us to see which model between four-factor model (i.e., model 5 in previous application) and this second-order model is better, (d) residuals associated with each item are uncorrelated; and (e) covariation among the four first-order factors is explained fully by their regression on the second-order factor.

- **Model 1**: The a priori CFA model exhibited perfect fit, see Table I.3. However, the residual variance of SOL has a negative value. This means that the model does not exactly fit the data because, to reproduce the correlations among first-order constructs, M*plus* apparently needed to increase the SOL's loading, which in turn resulted in negative error estimate. SOL's loading is greater than 1.0, meaning that SOL and RCT are the same thing. Therefore, the model needed to be modified.
- **Model 2**: Respecifying the model by imposing equality constraint on all first-order constructs. The model fit indices became worse. However, it is still good fit. Moreover,

the residual variance of SOL is no longer negative. This model is chosen to be the final model for the second-order construct of relational contract. The schematic model is presented in Figure I.3.

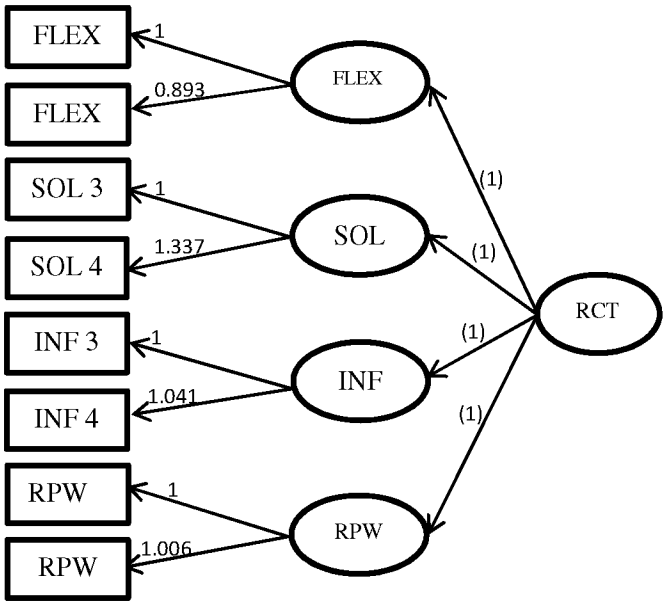

Figure I.3 Final model for second-order CFA model of relational governance
Note: Numbers above the links without parentheses represent fixed loadings, while ones with parentheses represent the equality constraint.

Table I.3 Second-order CFA relational governance with robust estimators

	MLM χ^2 (*df*), P-Value	**RMSEA estimate, 90% C.I., Close-fit test *P***		**CFI**	**TLI**	**SRMR**	**Remaining items**	**Specification**
M1	10.581(20), 0.9	0.000, 0.000-0.000, 0.998		1.000	1.030	0.025	FLEX2@1.000 FLEX3@0.893 SOL3@1.000 SOL4@1.337 INF3@1.000 INF4@1.041 RPW2@1.000 RPW3@1.006	A priori model
M2	30.696(22), 0.1025	0.045, 0.000-0.079 0.559		0.980	0.975	0.093	FLEX2@1.000 FLEX3@0.893 SOL3@1.000 SOL4@1.337 INF3@1.000 INF4@1.041 RPW2@1.000 RPW3@1.006	Loadings on FLEX, SOL, INF, and RPW are equality constrained.

Appendix J: Results from the preliminary test for interaction effect

Table J.1 Results from testing the individual interaction models

Note to table: Unstandardized parameter estimates of the effects, interaction paths significant at 5% level in bold.

Independent variables	Dependent variables								
	Cost reduction outcomes			End-product enhancement outcomes			Satisfaction with the collaboration		
	H7a			H7e			H7i		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Supplier-held specificity (SSI)	0.280	3.358	0.001	0.435	4.318	0.000	0.175	1.601	0.055
Formalization (FORM)	0.119	1.227	0.110	0.079	0.600	0.274	0.101	0.799	0.212
SSI*FORM	-0.067	-0.908	0.182	0.059	0.599	0.275	-0.134	-1.447	0.074
	H7b			H7f			**H7j**		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Buyer-held specificity (BSI)	0.262	2.811	0.003	0.232	1.982	0.024	0.288	2.583	0.005
Formalization (FORM)	0.270	2.533	0.006	0.254	2.007	0.023	0.241	2.042	0.021
BSI*FORM	**-0.208**	**-1.833**	**0.033**	-0.155	-1.246	0.107	**-0.289**	**-2.033**	**0.021**
	H7c			**H7g**			H7k		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Supplier-held specificity (SSI)	0.379	3.255	0.001	0.847	3.281	0.001	0.504	2.387	0.009
Centralization (CENT)	-0.400	-0.547	0.293	-3.085	-2.009	0.023	-2.267	-1.697	0.045
SSI*CENT	0.373	1.076	0.141	**1.060**	**2.029**	**0.022**	0.479	1.217	0.112
	H7d			**H7h**			**H7l**		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Buyer-held specificity (BSI)	0.286	1.939	0.026	-0.008	-0.037	0.485	0.027	0.148	0.442
Centralization (CENT)	-1.160	-0.889	0.187	-5.565	-2.833	0.003	-5.552	-3.033	0.001
BSI*CENT	**1.236**	**1.853**	**0.032**	**1.686**	**2.616**	**0.005**	**1.423**	**2.631**	**0.005**
	H8a			H8i			H8q		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Supplier-held specificity (SSI)	0.359	4.126	0.000	0.471	4.685	0.000	0.285	2.949	0.002
Flexibility (FLEX)	0.097	1.413	0.079	0.070	0.881	0.189	0.264	3.458	0.001
SSI*FLEX	-0.022	-0.372	0.355	0.012	0.162	0.436	0.052	0.983	0.163
	H8b			H8j			**H8r**		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Buyer-held specificity (BSI)	0.283	2.479	0.007	0.232	1.945	0.026	0.257	2.781	0.003
Flexibility (FLEX)	0.444	1.726	0.042	0.507	1.901	0.029	1.377	4.156	0.000
BSI*FLEX	**-0.400**	**-1.728**	**0.042**	-0.331	-1.452	0.073	**-0.694**	**-3.967**	**0.000**
	H8c			H8k			H8s		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Supplier-held specificity (SSI)	0.339	4.280	0.000	0.471	5.027	0.000	0.251	2.927	0.002
Solidarity (SOL)	0.301	3.070	0.001	0.287	2.512	0.006	0.601	5.316	0.000
SSI*SOL	-0.008	-0.092	0.464	-0.083	-0.647	0.259	-0.042	-0.338	0.368
	H8d			H8l			H8t		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Buyer-held specificity (BSI)	0.266	2.318	0.010	0.222	1.734	0.042	0.212	1.964	0.025
Solidarity (SOL)	0.207	1.848	0.033	0.196	1.478	0.070	0.535	4.224	0.000
BSI*SOL	**-0.212**	**-1.734**	**0.042**	-0.140	-0.984	0.163	-0.123	-0.878	0.190
	H8e			H8m			H8u		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Supplier-held specificity (SSI)	0.322	4.038	0.000	0.454	5.002	0.000	0.212	2.598	0.005
Information exchange (INF)	0.306	2.947	0.002	0.444	2.981	0.002	0.687	5.290	0.000
SSI*INF	-0.067	-0.675	0.250	-0.110	-0.837	0.201	-0.035	-0.310	0.379
	H8f			**H8n**			H8v		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Buyer-held specificity (BSI)	0.255	2.494	0.007	0.228	1.855	0.032	0.250	2.503	0.006
Information exchange (INF)	0.243	2.030	0.021	0.373	1.815	0.035	0.649	3.829	0.000
BSI*INF	**-0.231**	**-1.764**	**0.039**	**-0.341**	**-1.873**	**0.031**	-0.226	-1.447	0.074

Independent variables	Dependent variables								
	Cost reduction outcomes			End-product enhancement outcomes			Satisfaction with the collaboration		
	H8g			H8o			H8w		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Supplier-held specificity (SSI)	0.375	4.412	0.000	0.488	4.600	0.000	0.281	3.168	0.001
Restraint to the use of power (RPW)	0.161	2.474	0.007	0.136	1.786	0.037	0.235	3.928	0.00
SSI*RPW	-0.075	-1.218	0.112	-0.026	-0.403	0.344	-0.014	-0.255	0.400
	H8h			**H8p**			**H8x**		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Buyer-held specificity (BSI)	0.261	2.664	0.004	0.208	1.771	0.039	0.277	2.781	0.003
Restraint to the use of power (RPW)	7.869	2.469	0.007	11.901	2.613	0.005	14.296	4.425	0.000
BSI*RPW	**-4.772**	**-1.779**	**0.038**	**-5.810**	**-2.323**	**0.010**	**-7.268**	**-3.745**	**0.000**
	H9a			H9c			H9e		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Formalization (FORM)	0.243	2.471	0.007	2.233	1.884	0.030	0.213	2.058	0.020
Aggressive nego. str. (AGG)	0.034	0.370	0.356	-0.203	-1.487	0.069	-0.329	-3.353	0.001
FORM*AGG	0.087	0.692	0.245	-0.011	-0.062	0.476	0.057	0.393	0.348
	H9b			H9d			H9f		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Centralization (CENT)	1.898	1.663	0.048	1.166	0.837	0.202	-1.197	-0.949	0.172
Aggressive nego. str. (AGG)	-0.384	-1.059	0.145	-0.320	-0.743	0.229	-0.015	-0.039	0.485
CENT*AGG	-0.100	-0.416	0.339	-0.380	-1.500	0.067	0.051	0.208	0.418
	H10a			H10c			H10e		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Formalization (FORM)	0.239	2.598	0.005	0.223	1.946	0.026	0.189	1.845	0.033
Prob.-solv. nego. str. (PSV)	0.103	1.284	0.100	0.387	4.525	0.000	0.356	3.601	0.000
FORM*PSV	-0.058	-0.662	0.254	-0.102	-0.976	0.165	-0.091	-0.813	0.208
	H10b			**H10d**			H10f		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Formalization (FORM)	0.244	2.399	0.008	0.273	2.055	0.020	0.259	2.118	0.017
Centralization (CENT)	-0.008	-0.115	0.454	-0.099	-1.122	0.131	-0.141	-1.803	0.036
Prob.-solv. nego. str. (PSV)	0.083	0.947	0.172	0.353	3.189	0.001	0.338	3.123	0.001
FORM*PSV	-0.058	999.0	999.0	-0.102	999.0	999.0	-0.091	999.0	999.0
CENT*PSV	**0.107**	**1.738**	**0.041**	**0.198**	**2.288**	**0.011**	0.044	0.545	0.293
	H11a			H11e			H11i		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Flexibility (FLEX)	0.034	0.491	0.312	-0.042	-0.479	0.316	0.192	2.786	0.003
Aggressive nego. str. (AGG)	0.056	0.562	0.287	-0.163	-1.110	0.134	-0.258	-2.048	0.021
FLEX*AGG	-0.001	-0.011	0.496	0.093	0.868	0.193	0.035	0.463	0.322
	H11b			H11f			H11j		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Solidarity (SOL)	2.364	1.006	0.157	1.285	0.524	0.300	4.712	1.273	0.102
Information exchange (INF)	-0.539	-0.577	0.282	-0.035	-0.033	0.487	-1.233	-0.837	0.202
Restraint to the use of power (RPW)	-0.788	-0.920	0.179	-0.523	-0.608	0.272	-1.604	-1.216	0.112
Aggressive nego. str. (AGG)	0.347	0.976	0.165	0.027	0.084	0.467	0.350	0.658	0.256
SOL*AGG	-0.240	-1.373	0.085	-0.140	-0.675	0.250	0.007	0.034	0.487
INF*AGG	-0.064	999.0	999.0	-0.054	999.0	999.0	-0.001	999.0	999.0
RPW*AGG	0.169	999.0	999.0	0.166	999.0	999.0	0.059	999.0	999.0
	H11c			H11g			H11k		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Information exchange (INF)	0.393	2.917	0.002	0.418	2.456	0.007	0.623	4.680	0.000
Aggressive nego. str. (AGG)	0.147	1.116	0.133	-0.081	-0.470	0.319	-0.122	-0.980	0.164
INF*AGG	-0.064	-0.593	0.277	-0.054	-0.300	0.382	-0.001	-0.004	0.499
	H11d			H11h			H11l		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Restraint to the use of power (RPW)	1.601	1.737	0.041	0.124	0.154	0.439	2.231	1.891	0.030
Aggressive nego. str. (AGG)	0.773	1.645	0.050	-0.046	-0.121	0.452	0.594	1.153	0.125
RPW*AGG	0.169	0.809	0.210	0.166	0.726	0.234	0.059	0.237	0.406

Independent variables	Dependent variables								
	Cost reduction outcomes			End-product enhancement outcomes			Satisfaction with the collaboration		
	H12a			H12e			H12i		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Flexibility (FLEX)	-0.030	-0.390	0.349	-0.129	-1.555	0.120	0.098	1.274	0.230
Information exchange (INF)	0.293	2.431	0.008	0.298	1.666	0.096	0.551	3.943	0.000
Prob.-solv. nego. str. (PSV)	0.053	0.497	0.310	0.340	3.075	0.002	0.191	1.703	0.044
FLEX* PSV	-0.031	-0.594	0.277	-0.023	-0.308	0.758	-0.007	-0.122	0.452
INF*PSV	0.007	999.0	999.0	-0.278	999.0	999.0	-0.078	999.0	999.0
	H12b			H12f			H12j		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Solidarity (SOL)	1.010	0.888	0.188	-1.855	-0.983	0.163	1.910	1.163	0.123
Information exchange (INF)	-0.234	-0.375	0.354	1.214	1.211	0.113	-0.407	-0.457	0.324
Prob.-solv. nego. str. (PSV)	-0.245	-0.708	0.240	0.884	1.420	0.078	-0.330	-0.669	0.252
SOL* PSV	-0.039	-0.391	0.348	0.008	0.049	0.481	-0.022	-0.144	0.443
INF*PSV	0.007	999.0	999.0	-0.278	999.0	999.0	-0.078	999.0	999.0
	H12c			**H12g**			H12k		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Information exchange (INF)	0.286	2.576	0.005	0.249	1.551	0.061	0.578	4.689	0.000
Prob.-solv. nego. str. (PSV)	0.056	0.691	0.245	0.328	3.024	0.001	0.221	2.342	0.010
INF* PSV	0.007	0.078	0.469	**-0.278**	**-2.210**	**0.014**	-0.078	-0.693	0.244
	H12d			H12h			H12l		
	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value	Estimates	t-values	One-tailed P-value
Information exchange (INF)	0.285	2.313	0.011	0.325	1.736	0.042	0.569	4.112	0.000
Restraint to the use of power (RPW)	0.020	0.319	0.375	-0.107	-1.119	0.132	0.016	0.221	0.413
Prob.-solv. nego. str. (PSV)	0.041	0.469	0.320	0.328	3.116	0.001	0.223	2.225	0.013
INF*PSV	0.007	999.0	999.0	-0.278	999.0	999.0	-0.078	999.0	999.0
RPW* PSV	-0.012	-0.289	0.386	-0.032	-0.477	0.317	0.021	0.374	0.354

Appendix K: Descriptive statistics of the asymmetric power sample

Table K.1 Descriptive statistics of the asymmetric power sample, N=108

	Mean	S.D	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
Dependent variables						
Hierarchical governance						
Formalization						
FORM1	5.15	1.420	-0.806	0.233	0.207	0.461
FORM2	4.79	1.664	-0.585	0.233	-0.433	0.461
FORM3	5.63	1.294	-1.254	0.233	1.544	0.461
FORM5	5.37	1.615	-0.880	0.233	-0.049	0.461
Centralization						
CENT1	4.69	1.737	-0.574	0.233	-0.619	0.461
CENT2	4.71	1.571	-0.513	0.233	-0.675	0.461
Relational governance						
Flexibility						
FLEX2	4.37	1.722	-0.280	0.233	-0.869	0.461
FLEX3	4.06	1.815	-0.251	0.233	-1.075	0.461
Solidarity						
SOL3	4.82	1.459	-0.737	0.233	0.075	0.461
SOL4	4.84	1.572	-0.691	0.233	-0.342	0.461
Information exchange						
INF3	5.99	1.046	-1.281	0.233	1.604	0.461
INF4	5.44	1.248	-0.929	0.233	0.725	0.461
Restraint to the use of power						
RPW2	4.19	1.847	-0.309	0.233	-1.178	0.461
RPW3	4.51	1.638	-0.420	0.233	-0.624	0.461
Independent variables						
Stronger-held specific investments						
STSI1	2.61	1.521	0.961	0.233	0.238	0.461
STSI2	2.56	1.500	1.051	0.233	0.475	0.461
STSI3	2.27	1.392	1.010	0.233	0.197	0.461
STSI4	2.31	1.483	1.140	0.233	0.613	0.461
STSI5	2.57	1.499	0.847	0.233	-0.006	0.461
STSI6	2.44	1.376	1.082	0.233	0.895	0.461
STSI7	3.49	1.519	0.230	0.233	-0.623	0.461
STSI8	2.19	1.361	1.401	0.233	1.663	0.461
Buying firm's specific investments						
WKSI1	4.80	1.605	-0.808	0.233	0.041	0.461
WKSI2	4.53	1.626	-0.516	0.233	-0.474	0.461
WKSI3	4.09	1.683	-0.196	0.233	-0.823	0.461
WKSI4	4.37	1.770	-0.467	0.233	-0.831	0.461
WKSI5	4.29	1.708	-0.505	0.233	-0.700	0.461
WKSI6	3.00	1.612	0.464	0.233	-0.781	0.461
WKSI7	5.18	1.433	-1.132	0.233	0.958	0.461
WKSI8	4.35	1.779	-0.295	0.233	-0.816	0.461
Control variables						
Environmental uncertainty						
UNC1	3.93	1.700	0.129	0.233	-1.247	0.461
UNC2	4.21	1.624	0.035	0.233	-1.083	0.461
Opportunism						
OPP1	2.04	1.394	1.558	0.233	1.778	0.461
OPP4	2.25	1.601	1.210	0.233	0.387	0.461

Appendix L: Descriptive statistics of the asymmetric and symmetric power sample

Table L.1 Descriptive statistics of the asymmetric power sample, N=108

	Mean	S.D	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
Dependent variables						
Hierarchical governance						
Formalization						
FORM1	5.15	1.420	-0.806	0.233	0.207	0.461
FORM2	4.79	1.664	-0.585	0.233	-0.433	0.461
FORM3	5.63	1.294	-1.254	0.233	1.544	0.461
FORM5	5.37	1.615	-0.880	0.233	-0.049	0.461
Centralization						
CENT1	4.69	1.737	-0.574	0.233	-0.619	0.461
CENT2	4.71	1.571	-0.513	0.233	-0.675	0.461
Relational governance						
Flexibility						
FLEX2	4.37	1.722	-0.280	0.233	-0.869	0.461
FLEX3	4.06	1.815	-0.251	0.233	-1.075	0.461
Solidarity						
SOL3	4.82	1.459	-0.737	0.233	0.075	0.461
SOL4	4.84	1.572	-0.691	0.233	-0.342	0.461
Information exchange						
INF3	5.99	1.046	-1.281	0.233	1.604	0.461
INF4	5.44	1.248	-0.929	0.233	0.725	0.461
Restraint to the use of power						
RPW2	4.19	1.847	-0.309	0.233	-1.178	0.461
RPW3	4.51	1.638	-0.420	0.233	-0.624	0.461
Independent variables						
Supplier-held specific investments						
SSI2	4.60	1.612	-0.542	0.233	-0.418	0.461
SSI4	4.47	1.732	-0.563	0.233	-0.675	0.461
SSI5	4.31	1.689	-0.497	0.233	-0.689	0.461
Buyer-held specific investments						
BSI1	2.56	1.416	0.771	0.233	-0.304	0.461
BSI3	2.19	1.322	1.094	0.233	0.497	0.461
BSI5	2.55	1.488	0.837	0.233	-0.043	0.461
BSI6	2.39	1.289	0.838	0.233	0.188	0.461
BSI8	2.29	1.401	1.113	0.233	0.660	0.461
Control variables						
Environmental uncertainty						
UNC1	3.93	1.700	0.129	0.233	-1.247	0.461
UNC2	4.21	1.624	0.035	0.233	-1.083	0.461
Opportunism						
OPP1	2.04	1.394	1.558	0.233	1.778	0.461
OPP4	2.25	1.601	1.210	0.233	0.387	0.461

Table L.2 Descriptive statistics of the symmetric power sample, N=90

	Mean	S.D	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
Dependent variables						
Hierarchical governance						
Formalization						
FORM1	5.31	1.329	-0.800	0.254	0.411	0.503
FORM2	4.62	1.815	-0.536	0.254	-0.787	0.503
FORM3	5.50	1.220	-0.892	0.254	0.891	0.503
FORM5	5.37	1.692	-1.024	0.254	0.198	0.503
Centralization						
CENT1	4.26	1.771	-0.224	0.254	-0.965	0.503
CENT2	4.38	1.752	-0.292	0.254	-0.970	0.503
Relational governance						
Flexibility						
FLEX2	4.26	1.646	-0.266	0.254	-0.869	0.461
FLEX3	4.08	1.850	-0.204	0.254	-1.075	0.461
Solidarity						
SOL3	5.20	1.300	-0.790	0.254	0.075	0.461
SOL4	5.29	1.493	-0.843	0.254	-0.342	0.461
Information exchange						
INF3	6.03	1.022	-1.555	0.254	1.604	0.461
INF4	5.74	1.087	-1.512	0.254	0.725	0.461
Restraint to the use of power						
RPW2	4.81	1.621	-0.756	0.254	-1.178	0.461
RPW3	4.88	1.452	-0.796	0.254	-0.624	0.461
Independent variables						
Supplier-held specific investments						
SSI2	4.18	1.625	-0.294	0.254	-0.901	0.503
SSI4	4.22	1.592	-0.135	0.254	-0.699	0.503
SSI5	4.28	1.507	-0.327	0.254	-0.625	0.503
Buyer-held specific investments						
BSI1	2.54	1.545	1.122	0.254	0.711	0.503
BSI3	2.32	1.754	1.371	0.254	0.698	0.503
BSI5	2.32	1.444	1.085	0.254	0.309	0.503
BSI6	2.19	1.348	1.250	0.254	0.696	0.503
BSI8	2.24	1.494	1.327	0.254	1.028	0.503
Control variables						
Environmental uncertainty						
UNC1	4.24	1.524	0.043	0.254	-1.006	0.503
UNC2	4.26	1.458	0.299	0.254	-0.702	0.503
Opportunism						
OPP1	1.91	1.233	1.571	0.254	2.039	0.503
OPP4	2.06	1.401	1.654	0.254	2.172	0.503

Appendix M: Descriptive statistics of the mutual dependent and no-interdependent sample

Table M.1 Descriptive statistics of the mutual dependence sample, N=57

	Mean	S.D	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
Dependent variables						
Formalization						
FORM1	5.42	1.295	-0.945	0.316	1.054	0.623
FORM2	4.74	1.737	-0.637	0.316	-0.532	0.623
FORM3	5.33	1.244	-1.017	0.316	1.476	0.623
FORM5	5.35	1.768	-0.960	0.316	-0.093	0.623
Centralization						
CENT1	4.32	1.627	-0.199	0.316	-0.744	0.623
CENT2	4.47	1.616	-0.188	0.316	-0.880	0.623
Relational governance						
Flexibility						
FLEX2	4.12	1.659	-0.348	0.316	-0.798	0.623
FLEX3	4.12	1.862	-0.254	0.316	-1.135	0.623
Solidarity						
SOL3	5.26	1.203	-0.468	0.316	-0.308	0.623
SOL4	5.42	1.375	-0.940	0.316	-0.278	0.623
Information exchange						
INF3	6.18	0.805	-1.400	0.316	**3.612**	0.623
INF4	5.91	1.023	-2.207	0.316	**8.602**	0.623
Restraint to the use of power						
RPW2	4.88	1.536	-0.706	0.316	0.021	0.623
RPW3	4.96	1.336	-0.539	0.316	0.462	0.623
Independent variables						
Supplier-held specific investments						
SSI2	4.56	1.402	-0.614	0.316	0.166	0.623
SSI4	4.49	1.465	-0.282	0.316	-0.362	0.623
SSI5	4.56	1.350	-0.406	0.316	-0.039	0.623
Buyer-held specific investments						
BSI1	2.79	1.601	0.899	0.316	0.355	0.623
BSI3	2.53	1.853	1.240	0.316	0.306	0.623
BSI5	2.44	1.376	0.900	0.316	0.149	0.623
BSI6	2.40	1.348	0.984	0.316	0.038	0.623
BSI8	2.54	1.593	1.098	0.316	0.435	0.623
Control variables						
Environmental uncertainty						
UNC1	4.40	1.510	0.014	0.316	-0.896	0.623
UNC2	4.26	1.458	0.489	0.316	-0.533	0.623
Opportunism						
OPP1	1.89	1.113	1.423	0.316	1.522	0.623
OPP4	2.09	1.392	1.566	0.316	2.163	0.623

Table M.2 Descriptive statistics of the no-interdependence sample, N=33

	Mean	S.D	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
Dependent variables						
Formalization						
FORM1	5.12	1.386	-0.604	0.409	-0.160	0.798
FORM2	4.42	1.953	-0.375	0.409	-1.081	0.798
FORM3	5.79	1.139	-0.636	0.409	-0.979	0.798
FORM5	5.39	1.580	-1.210	0.409	1.173	0.798
Centralization						
CENT1	4.15	1.478	-1.117	0.409	0.542	0.798
CENT2	4.21	1.623	-0.111	0.409	-1.219	0.798
Relational governance						
Flexibility						
FLEX2	4.48	1.659	-0.348	0.316	-0.798	0.623
FLEX3	4.00	1.862	-0.254	0.316	-1.135	0.623
Solidarity						
SOL3	5.09	1.203	-0.468	0.316	-0.308	0.623
SOL4	5.06	1.375	-0.940	0.316	-0.278	0.623
Information exchange						
INF3	5.79	0.805	-1.400	0.316	**3.612**	0.623
INF4	5.45	1.023	-2.207	0.316	**8.602**	0.623
Restraint to the use of power						
RPW2	4.70	1.536	-0.706	0.316	0.021	0.623
RPW3	4.73	1.336	-0.539	0.316	0.462	0.623
Independent variables						
Supplier-held specific investments						
SSI2	3.52	1.787	0.376	0.409	-1.202	0.798
SSI4	3.76	1.714	0.243	0.409	-0.779	0.798
SSI5	3.79	1.654	0.007	0.409	-1.155	0.798
Buyer-held specific investments						
BSI1	2.12	1.364	1.735	0.409	**2.742**	0.798
BSI3	1.97	1.531	1.668	0.409	1.727	0.798
BSI5	2.12	1.556	1.480	0.409	1.103	0.798
BSI6	1.82	1.286	2.051	0.409	**3.907**	0.798
BSI8	1.73	1.153	1.877	0.409	**2.843**	0.798
Control variables						
Environmental uncertainty						
UNC1	3.97	1.531	0.110	0.409	-1.215	0.798
UNC2	4.24	1.480	-0.015	0.409	-0.939	0.798
Opportunism						
OPP1	1.94	1.435	1.667	0.409	2.180	0.798
OPP4	2.00	1.436	1.887	0.409	**2.812**	0.798