Master Thesis

"Governing explorative and exploitative Strategic Technology Alliances: comparing ownership structure, trust and contract"

UNIVERSITY OF TWENTE.

Student name: David (D.S.C.) Sala

Student number: s0182222

Study: Business Administration

Specialization: Innovation and entrepreneurship

Email: d.s.c.sala@student.utwente.nl

Supervisors: Dr. D.L.M. Faems & R.P.A. Loohuis MBA

Governing explorative and exploitative Strategic Technology Alliances: comparing ownership structure, trust and contract complexity

31-03-2011

David Sebastiaan Carolus Sala

Business Administration at the University of Twente

Specialization: Innovation and Entrepreneurship

Student number.: S0182222

Van lippe biesterfeldstraat 13

3523 VA Utrecht

06 422 71 243

d.s.c.sala@student.utwente.nl

dscsala@gmail.com

Supervisors:

Supervisor 1:

Dr. D.L.M. Faems

Supervisor 2:

R.P.A. Loohuis MBA

Preface

After graduating as Bachelor of Engineering in Haarlem, I had the ambition to fulfil a position between technology development and business strategy. To get acquainted with organisational strategy, innovation processes and entrepreneurship, the Master Innovation and Entrepreneurship provided me a challenging curriculum of courses. During the Master I developed an interest for Strategic Technology Alliances. By writing a master thesis focusing on this subject, I had the opportunity to gain a better understanding about this debatable topic from an academic perspective. Furthermore, by focusing on Strategic Technology Alliances, I was able to make a start in achieving my future goal of combining business strategy and technology development. Nevertheless, this thesis would not have been able to take place without the help of others.

First of all, I would like to thank my supervisors, dr. D.L.M. Faems and R.P.A. Loohuis MBA. Dr. Faems has helped from the start of this thesis and encouraged me to investigated STAs in this research setting. Furthermore, he provided me constructive feedback that helped me to improve this thesis. Second, R.P.A. Loohuis MBA provided me a lot of useful insights on this research topic in the final stages of my thesis.

Second, I would like to thank Port4Growth for providing me the opportunity to collect data during their events.

Third, a special recognition for my family for their unqualified support and encouragement. A special thanks go to my parents who gave me the opportunity to graduate at the University of Twente. Furthermore, special thanks go to my girlfriend Roxanne who was always willing to support me and motivated me to finish this thesis. Besides the support, I want to thank Roxanne for her patience and the cheerful distraction she offered during writing this thesis.

Finally, thanks go to my friend Michiel. Michiel has been a friend since our study Business Engineering and we always stood side by side during our student career. He is a friend who not only supported me during writing this thesis, but during our whole study career.

David Sala

Utrecht, March 2011

Abstract

In the literature of alliance governance, it has been provoked that research should have a more contextualized view on alliance governance, since there are indications provided that STAs require unique governance challenges per innovation trajectory stage (Faems, 2006; Koza & Lewin, 1998; Pateli, 2009; Poppo & Zenger, 2002; Rothaermel & Deeds, 2004). To gain a more fine grained understanding on these governance challenges, this study investigated the differences in 3 key governance drivers between explorative and exploitative STAs to examine whether STAs can be best considered as heterogeneous inter-organisational arrangements. The differences between explorative and exploitative STA are derived from the objective of the STA (Koza & Lewin, 1998; Lavie & Rosenkopf, 2006, March, 1991). The investigated specific governance challenges are derived from the governance phase of the alliance life cycle and include the ownership structure, trust and contract complexity (Kale & Singh, 2009).

Ownership structure determines the formal arrangement (i.e. non-equity or equity) between alliance partners. Trust is "the confidence held by one party in its expectations of the behaviour and goodwill of another party regarding business actions" (Carson, Madhok, Varman, & John, 2003, p. 46). Contract complexity refers to the extent of using safeguards in contracts to describe the agreements between partners and is perceived as legally binding (Lyons & Mehta,1997).

To test the formulated hypotheses empirically, a sample of 40 STAs in Dutch Small Medium sized Enterprises within different sectors is used. To analyse the differences between explorative and exploitative STAs, Chi-square and independent T-tests are applied. Furthermore, the influence of type of partner, level of technology, number of partners and prior ties on the governance challenges is analysed with binary logistic regression and linear regression analyses.

This study has found that contract complexity is significantly higher in explorative STAs, while the ownership structure and level of trust do not significantly differ between explorative and exploitative STAs. The control variables confirmed that the type of STA affects contract complexity. This finding indicates that, based on the transaction cost economics theory, a more structural perspective is selected in exploitative STAs. Furthermore, the number of partners significantly influence the ownerships structure in a way that dyadic STAs rely more on equity ownership structures than constellations do. Finally, the ownership structure and the level of trust do not differ across the explorative and exploitative STAs.

Table of contents

1 Research design

This chapter contains the research motive, the research objective and the research contributions. Moreover, the demarcation and content and structure are addressed.

1.1 Research motive

Research on Strategic Alliances has increased significantly, reflecting the central role Strategic Alliances play in organisations' competitive and growth strategies (Kale & Singh, 2009; Koza & Lewin, 1998; Narula & Hagedoorn, 1999). Especially for technology orientated organisations alliances have become an increasingly popular strategy to enhance their internal R&D efforts (Duysters, Kok & Baandrager, 1999; Hagedoorn, 2002). Research conducted by Culpan and Kostelac (1993) found that Strategic Technology Alliances, alliances in which the development of technology is a strategic objective for at least 1 alliance partner, account for approximately 10.8 % of all alliances (Sadowski & Duysters, 2008). In addition, the growth rate of knowledge intensive alliances is 3 times higher than of other alliance types (Duysters et al., 1999).

Nevertheless, an increase in the Strategic Technology Alliances undertaken does not imply that these alliances are successful by definition. Studies have reported Strategic Alliance failure rates ranging from 50% to 80% (Spekman, Forbes, Isabella, & MacAvoy, 1998) and Strategic Technology Alliances form no exception in this respect (Duysters et al., 1999). To decrease the failure rates and risks involved, one can investigate the alliance formation, alliance governance or alliance management, i.e. the phases of the alliance life cycle (Kale & Singh, 2009). Earlier research has focused extensively on partner selection and a comprehensive literature review of Shah and Swaminathan (2008) found that partner complementarity, partner compatibility and partner commitment are essential contingencies to select partners.

After selecting an appropriate partner, organisations are exposed to various "transaction or coordination hazards that can affect the organisation itself and the partners involved" (Kale & Singh, 2009:p. 48). To determine how the governance of Strategic Technology Alliances can be best designed, two different perspectives have emerged; the structural perspective and the relational perspective (Madhok, 1995; Faems, 2006). Both perspectives are based on different assumptions about the governance of alliances. The relational perspective is based on the social exchange theory (Blau, 1964) and emphasizes that trust is the governance mechanism for alliance governance (Faems et al., 2008). The structural perspective is grounded on the transaction cost theory (Williamson, 1985) and emphasizes that partners have the tendency to behave opportunistically. Therefore, this perspective states that formal contracts are the most ideal governance mechanism to cope with alliance governance (Faems et al., 2008; Madhok, 1995).

One of the most debatable topics so far is how these two perspectives are related to each other. It is ambiguous whether the structural and relational perspective are complementary or substitutes in the governance of Strategic Technology Alliances (Bradach & Eccles, 1989; Faems et al., 2008; Poppo & Zenger, 2002; Ring & Van de Ven, 1994). Furthermore, Strategic Technology Alliances itself and the organisations involved in the partnership are subject to changes. According to Koza and Lewin (1998), Strategic Technology Alliances co-evolve with a firm's strategy, competitive environment and with the strategic intent of the Strategic Technology Alliance. Therefore, Koza and Lewin (1998) and Poppo and Zenger (2002) suggest to investigate these dynamics to determine how these perspectives co-evolve over the types of Strategic Technology Alliances. This is in line with the research gap Faems (2006) notified. According to Faems (2006), research should have a more contextualized view on alliance governance and he conducted research on the specific governance challenges that are faced in Strategic Technology Alliances situated in the different innovation trajectory stages. Although Faems (2006) was able to identify specific governance challenges for 2 Strategic Technology Alliance types (i.e. exploration and exploitation), Faems (2006) also concluded that future research examining the specific governance challenges in each stage of the innovation trajectory would be valuable.

1.2 Research objective

This study has the aim to gain a fine-grained understanding of the specific governance challenges in explorative and exploitative Strategic Technology Alliances. Consequently, in this study a quantitative research is conducted that examines the governance challenges in explorative and exploitative Strategic Technology Alliances. In explorative Strategic Technology Alliances partners search for "new knowledge, the use of unfamiliar technologies and the creation of products with unknown demand". In exploitative Strategic Technology Alliances partners "use and refine existing knowledge, technologies and products and these Strategic Technology Alliances have more certain and proximate benefits" (March, 1991; Koza & Lewin, 1998; Greve, 2007:p. 1). According to Kale and Singh (2009), the key governance drivers for the alliance governance and design phase are the ownership structure, the level of trust and the contract complexity. This study will investigate if the type of Strategic Technology Alliance (i.e. explorative and exploitive) as a whole is a condition to select an ownerships structure and governance mechanisms (i.e. level of trust and contract complexity).

Based on the different types of Strategic Technology Alliances and the selected key governance drivers, the following research question is formulated: *'What are the differences in terms of ownership structure, trust and contract complexity between explorative and exploitative Strategic Technology Alliances?'*

1.3 Research contributions

This study will contribute to the understanding of the specific governance challenges per Strategic Technology Alliance type. For alliances having either an explorative or exploitative objective, the outcomes of this study can be valuable to optimize the choice of structure and governance. For alliances transiting from an explorative to an exploitative objective or reversely, alliance partners can adjust the ownership structure and governance mechanisms for the different types of alliances (Cagliano, Chiesa & Manzini, 2000). If differences between explorative and exploitative Strategic Technology Alliances are found, this would allow academic research to incorporate these differences in future research as an explanatory variable (Sadowski & Duysters, 2008). Strategic Technology Alliances can then be considered as a heterogeneous group of inter-organisational arrangements requiring unique alliance governance challenges per type of Strategic Technology Alliance.

1.4 Demarcation

This study will only focus on Strategic Technology Alliances in Dutch Small and Medium Enterprises (SMEs). The reason for selecting SMEs lies in the increasing globalization and demand for multiple technological competences (Hoffmann & Schlosser, 2001; Narula, 2004; Narula & Hagedoorn, 1999). SMEs have the traditional advantage of being flexible and are able to respond rapidly on changing environmental conditions. Consequently, also larger organisations can benefit from this flexibility by forming alliances. Therefore, the need for SMEs to compete successfully by forming Strategic Technology Alliances can be considered as essential (Hoffmann & Schlosser, 2001; Narula, 2004). Collaboration research tailored to the essentials of SMEs is also required, because these organisations face problems and challenges that are different, in many respects, from those of large enterprises (Hoffmann & Schlosser, 2001). The reason to select Dutch SMEs can be related to the fact that 99% of all Dutch organisations are SMEs. These organisations represent 58% of the total turnover and employ 60% of all employees in the Netherlands (CBS, 2009). Since this study focuses on the individual alliances SMEs engage in, only dyadic and constellation alliances will be included. Dyadic alliances consist of maximally two collaborating organisations and a constellation alliance consists of more than two STA partners (Garcia-Canal et al., 2003; Das & Teng, 2002, Faems, 2006, Gulati, 1998).

1.5 Content and structure

This report is structured as follows. Chapter 2 examines the relevant theory regarding Strategic Technology Alliances and the variables being studied. Chapter 3 describes the research hypotheses. Chapter 4 contains the research methodology and operationalisation. Chapter 5 describes the results of the empirical research. The main research question will be answered in chapter 6. Furthermore, chapter 6 addresses the discussion, research limitations and provides suggestions for further research.

2 Theoretical framework

This chapter addresses the theoretical background and the most relevant studies regarding Strategic Technology Alliances (STAs). After defining STAs in paragraph 2.1, the subsequent paragraph focuses on the key drivers in the design and governance phase of the alliance life cycle. Paragraphs 2.3 and 2.4. define the ownership structures and the governance mechanisms.

2.1 Define Strategic Technology Alliances

STAs occur within the "context of technology innovation in volatile environments wherein technology innovation refers to either new products, services or new production and delivery processes" (Tether, 1999, as sited in Pateli & Giaglis, 2007;p. 311). Sadowski and Duysters (2008) provide a clear definition of STAs that will be used for this study. They defined STAs as: *"...A formal collaboration between independent organisations in which the development of technology is a strategic objective for at least 1 alliance partner"* (Sadowski & Duysters, 2008). This definition allows us to focus on the importance of the technological component and excludes short term inter-firm agreements and more conventional alliances, like marketing alliances (Sadowski & Duysters, 2008).

Academic literature maintains the terms 'R&D alliances' and 'Strategic Technology Alliances' when referring to formal inter-organisational collaborations. In both definitions technology forms the main element of the collaboration. Therefore, the terms R&D alliance and STA will be considered as synonyms, but only the term STA will be used in the remainder of this study. Underlying reason is that the term STA can refer to all stages of the innovation trajectory while the term R&D alliance can only refer to the research and development stage.

In the research stream of STAs there are different theoretical perspectives that have examined STA governance among other governance options, like internal R&D strategies or acquisitions (Faems, 2006: Santoro and McGill, 20005; Pateli, 2009; Das and Teng, 2000; Gulati, 1995a; Kogut, 1991). These perspectives include transaction cost economics perspective (Williamson (1991), resource-based view (Kogut & Zander, 1992; Zollo, Reuer & Singh, 2002) and real options perspective (Pateli, 2009; Santoro & McGill, 2005). The majority of the current STA studies are grounded in the transaction cost perspective (Pateli, 2009). According to this theory, governance ownership structures and mechanisms are selected to minimize the sum of production and coordination costs (Santoro & McGill, 2005; Williamson, 1981; Pateli, 2009). The resource based view stresses the importance of value maximalisation in STAs by allowing resource exchanges and the possibility to accumulate resources that are valuable, rare and difficult to substitute or imitate with the aim to achieve a sustainable competitive advantage for both partners (Faems, 2006, McGee, Thomas and Wilson, 2005).

Finally, a more recent stream, the real options perspective, frames alliance governance as 'the option to defer' and 'the option to growth' (Pateli, 2009). Environment uncertainty impacts the decision to invest in future rent generating opportunities. In the first option, organisations decide to maintain flexibility under conditions of uncertainty. The conditions of (market) uncertainty ensure the success and feasibility of the investment remains uncertain and leads to organisations waiting for more information to become available and to make more informed decisions. The second option, the growth option, argues that waiting may also involve opportunity costs. In other words, if organisations aim to gain a competitive advantage, they are willing to make high-value investments.

2.2 Key drivers in the alliance life cycle

The governance key drivers are derived from literature focusing on the alliance life cycle, i.e. the phases of the alliance evolution (Kale & Singh, 2009). A STA passes through all phases of the alliance life cycle consisting of the alliance formation & the partner selection phase, the alliance design & governance phase and the post formation management phase.

This study has the objective to find the differences between specific governance challenges of STAs and explorative and exploitative STAs. It is decided to investigate the key drivers mentioned in 'the alliance design & governance phase', because in this life cycle phase STA partners face specific governance challenges. Table 2.1 outlines the governance key drivers of the design & governance phase that will be examined.

Table 2.1: Key drivers of the alliance design and governance phases (adapted from Kale and Singh (2009))

Alliance design and governance phase	
Governance key drivers	Equity sharing or ownership
	Contractual provisions
	Relational governance

In the alliance literature 2 streams of governance research can be discerned (Faems, 2006). The first stream focuses on the governance of alliances in terms of the choice of a particular ownership structure and is covered by the first key driver of the alliance design & governance phase. Paragraph 2.3 will focus on this first research stream and will be referred to as the ownership structure of the STA. This paragraph will outline the specific ownership structures distinguished and the factors influencing the decision to select a certain ownership structure.

The second stream of literature focuses on the governance of alliances in terms of the management of the collaborative process and covers the key drivers contractual provisions and relational governance distinguished by Kale & Singh (2009). This research stream will be elaborated in paragraph 2.4 and will be referred to as governance mechanisms in the remainder of this study.

2.3 Ownership structures in STAs

This paragraph focuses on the governance of alliances in terms of the choice of a particular ownership structure for the STA. The ownership structure involves the specific structures distinguished and the factors influencing the decision to select a certain ownership structure (Faems, 2006; Pateli, 2009; Santoro & McGill, 2005). Before making a decision about the structure of the STA, two challenges arise; 1) the risk of opportunistic behaviour and 2) the effort required to achieve coordination action between alliance partners (Faems, 2006).

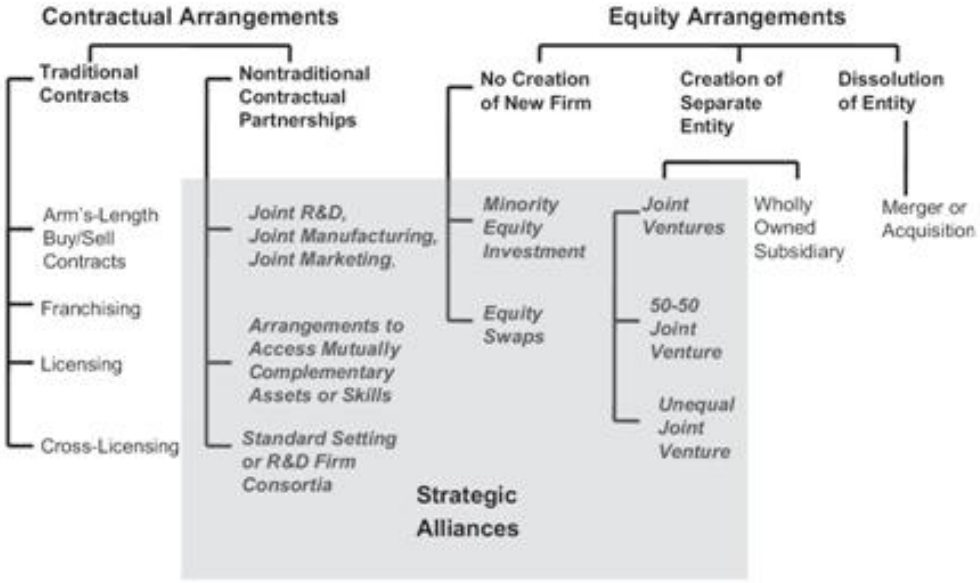
The first challenge involves whether the individual organisational interests are aligned with the alliance partners' interests (Das & Teng, 2001). Opportunistic behaviour includes cheating, shirking and the transfer of unintended knowledge (Pisano, 1991; Teng & Das, 2008). Especially when direct competitors engage in a STA, 1 of the partners can try to get ahead through learning races and to gain knowledge useful for competing in the marketplace. To prevent opportunistic behaviour and provide confidence in partner cooperation, partners include various control mechanisms, like contracts (Teng & Das, 2008). Nevertheless, control mechanisms are costly and time consuming in explorative STAs. Therefore, several scholars consider trust as a mechanism to reduce the reliance on formal governance mechanisms (Puranam & Vanneste, 2009). This makes one believe that the choice of a certain ownership structure and governance type is a balanced consideration (Puranam & Vanneste, 2009).

The second challenge involves achieving coordinated action between the different collaboration partners. Achieving coordinated action becomes complicated due to the fact that alliances cannot make an appeal to all hierarchical structures and systems that are available within organisations. Furthermore, variations in nationality and corporate culture can result in problems regarding the coordination between partners (Gulati & Singh, 1998; Parkhe, 1991).

Figure 2.1 illustrates an overview of all forms of interfirm relationships. The grey area outlines 2 Strategic Alliance arrangements for Strategic Alliances, namely non-equity arrangements and equity arrangements. In this paragraph the non-equity ownership structure and equity arrangements, distinguished by equity and joint ventures ownership structures, will be elaborated.

The ownership structures differ on the level of control, commitment, flexibility, knowledge transfer and transaction costs (Gulati, 1995a; Kale, Singh, & Perlmutter, 2000; Narula & Hagedoorn, 1999; Pateli, 2009; Teece, 1992).

Figure 2.1: Scope of interfirm relationships (adapted from Kale & Singh (2009); Yoshino & Rangan (1995))



In the following sub paragraphs the existing differences between non-equity, equity and joint ventures ownership structures will be elaborated.

2.3.1 Non-equity ownership structure

A non-equity ownership structure is a contractual arrangement that does not include an equity position, provides greater partner flexibility, less commitment and is usually short-term (Bierly & Coombs, 2004; Hagedoorn, 1993; Hagedoorn & Narula, 1996). Non-equity alliances are very efficient for explicit, simple arrangements and can be negotiated relatively rapidly (Gulati, 1995a), since the partners generally do not make significant alliance investments. Especially in high-tech sectors that are characterized by increasing technology clock speed and decreasing product life cycles, organisations feel constant pressure to remain flexible, to respond quickly to changing market needs and new technological opportunities (Duysters, et al., 1999).

Nevertheless, in this type of structure it is difficult to align the interests and to stimulate knowledge transfer and integration, due to the leakage of trust (Bierly & Coombs, 2004). Furthermore, the absence of hierarchical and ownership control results in rigid contractual control and lowers the level of trust (Das & Teng, 1998).

2.3.2 Equity ownership structure

In equity ownership structures, each partner holds an equity position and gains a proportional share of dividend as compensation. Faems (2006) makes a distinction in 2 types of equity alliances, namely minority and majority equity alliances (see figure 2.1). In the first structure there is for example 30% equity interest for 1 partner and 70% for another partner. In majority equity investments the equity interests are equally shared, i.e. 50% for each partner (Faems, 2006).

An equity ownership structure creates better access to information, partners can more easily monitor performance and there is a higher level of control in comparison with non-equity arrangements. Furthermore, the level of flexibility is in comparison with joint ventures relatively high. However, this creates a lower level of trust and ensures that transferring and integrating knowledge becomes more difficult (Das & Teng, 1998). In addition, an equity alliance requires a higher level of commitment, since the alliances are formed for a longer time period than non-equity alliances. Due to the higher level of commitment and familiarity, equity alliances frequently lead to an acquisition. In these cases the equity alliance was just a trial period to see how the culture, systems, and structures could be integrated (Bierly & Coombs, 2004; Bleeke & Ernst, 1995).

2.3.3 Joint venture ownership structure

A joint venture is an ownership structure wherein 2 or more parent organisations create a separate new entity. The new entity has its own corporate identity, resources and organizational structure and the organisations involved share equity (Awazu, 2006; Pateli & Giaglis, 2007). The joint venture ownership structure is the most effective way for transferring and integrating (tacit) knowledge, because employees of the parent organisations are working together with clear control measures towards the partner and new joint venture entity. Nevertheless, the board of directors are frequently representatives of the parent organisations. Therefore, joint ventures can have unintended knowledge transfer as a result of the close relationships of the employees of the parent organisations (Bierly & Coombs, 2004). Furthermore, the long-term commitment and significant investment results in a limited flexibility. Especially the conflicts in cultures and control systems, are the major reason of failure in this STA ownership structure (Ohmae, 1989).

2.3.4 Factors influencing ownership structures

Research regarding ownership structures indentified 6 factors that can influence the ownership structure decision and each factor is explained in the subsequent paragraphs.

The first factor influencing the choice of an ownership structure is firm size (Osborn & Baughn, 1990). Whereas SMEs prefer less hierarchical structures to not lose autonomy, large organisations prefer more hierarchical structures, like equity alliances or joint ventures to have the exploitation power over the resources (Tether, 2002; Pateli, 2009). The reason STAs between SMEs and large organisations can run into problems lies in the differences in communication cultures. SMEs generally have not created any internal routines for communicating and transferring technology and rely on a higher degree of tacit knowledge (Alm & McKelvey, 2000).

The second factor involves the extent of appropriation concerns. Earlier studies found that equity and joint venture structures are more effective in addressing appropriation concerns than non-equity ownership structures (Faems, 2006). For instance, (Mitchell, Dussauge, & Garrette, 2002) found that the greater the partner compatibility, the more likely the organisation will raise preference for equity or joint venture ownership structures. Partner compatibility refers to the complementarity of resources, coupled with the cultural and operational compatibility between partners (Parkhe, 1991). Joint ventures enhance the ability for partners to control and monitor alliance activities and to decrease appropriation hazards (Pisano, 1989).

The extent of coordination costs is the third factor that can influence the ownership structure decision (Gulati & Singh, 1998). As stated earlier, the equity alliance structure provides better opportunities to apply hierarchical control mechanisms, like authority systems, incentive structures, and standard operating procedures, that can facilitate coordination between partners. Therefore, the higher the anticipated coordination costs, the more likely that an equity ownership structure will be selected (Gulati & Singh, 1998).

The fourth factor involves technological uncertainty. According to Faems (2006) and Santoro & McGill (2005), a high level of technological uncertainty decreases the likelihood that an equity ownership structure will be selected. In line with this reasoning, Steensma and Corley (2001) argue that high formation, organisation and dissolution costs make hierarchical structures less attractive when technological uncertainty increases. As a result, organisations start to use non-equity structures rather than hierarchical arrangements to probe new technology applications (Santoro & McGill, 2005).

The fifth factor that influences the decision for a certain ownership structure is alliance experience (Gulati, 1995a). Mutual experience and trust created by earlier STAs decreases partner uncertainty (Gulati, 1995b). Prior alliance experience between partners ensures a trust relationship is built and the need for costly monitor and control mechanisms is reduced (Santoro & McGill, 2005; Reuer & Arino, 2007).

From a transaction cost perspective, trust diminishes the fear of opportunistic behaviour among the partner firms (Gulati, 1995a). Research of Gulati (1995b) and Gulati and Singh (1998) showed that STA partners with prior ties more likely choose non-equity ownership structures than equity ownership structures. Nevertheless, Pateli (2009) stated that from a real options perspective a longer alliance history ensures that partners raise preference for equity alliances, because partners are encouraged to commit more resources to opt for future growth. Furthermore, partners that were engaged in a non-equity structure in earlier STAs will more likely collaborate with an equity ownership structure in the future (Pateli, 2009).

The final factor that might influence the ownership structure is the total number of partners involved in a STA. Garcia-Canel, Baldes-Llaneza & Arino (2003) indicated that the influence of dyadic or constellations is related to the difficulty to manage alliance with multiple partners. Therefore, an equity ownership structure in combination with a more contractual coordination is more often used in constellations to protect partners against misbehaviour of one of its partners and free riding.

Pateli (2009) assumes that these 6 factors not only influence the alliance ownership structure, but also can be seen as factors that contribute to successfully forming STAs. However, this study will first investigate whether a explorative or exploitative STA type as a whole is a condition for selecting a particular alliance ownership structure. Subsequently, it will be investigated to which extent the factors indeed influence the type of ownership structure.

2.4 Governance mechanisms

As stated earlier, 2 challenges arise when selecting appropriate STA governance mechanisms: 1) the risk of opportunistic behaviour and 2) achieving coordinated action between alliance partners. Based on these challenges, the discussion about how alliances can be managed efficiently and effectively began. Both the structural and the relational perspective aim to find an answer on this question (Faems, 2006; Faems, Janssens, Madhok, & Van Looy, 2008). The relational perspective is based on the social exchange theory (Blau, 1964) and emphasizes that trust is the governance mechanism for alliances governance (Faems et al., 2008). Trust can be defined as “the confidence held by one party in its expectations of the behaviour and goodwill of another party regarding business actions” (Carson, Madhok, Varman, & John, 2003, p. 46). The structural perspective is grounded on the transaction cost theory (Williamson, 1985) and emphasizes that partners have the tendency to behave opportunistically (Faems et al., 2008; Madhok, 1995). Therefore, this perspective states that formal contracts are the most ideal governance mechanism to cope with STA challenges (Faems et al., 2008).

Formal contracts can be defined as “documents that describe an agreement in writing between two or more parties and is perceived as legally binding” (Lyons & Mehta, 1997, p. 241). Table 2.4 contains an overview of the differences of these two perspectives.

Table 2.4: Overview of the structural and relational perspective (adapated from Faems, et al. (2008); Nooteboom (1996))

	Structural perspective	Relational perspective
Theoretical basis	Transaction cost theory	Social exchange theory
Main assumptions	Partners have the tendency to act opportunistically Alliances performance is driven by the quality of the initial structural design	Partners have the tendency to act in a trustworthy fashion Alliances performance is driven by the quality of the ongoing relational processes
Emphasis	On outcomes	On process
Partners acting tendency	Opportunistic	Trustworthy
Main governance mechanism	Complex contracts	Relational trust
Criticism	Too negative perception of human behaviour and does not take the effect of multiple interactions into account	Too positive perception of human behaviour
Alliance performance is dependent of	Contract specifity and completeness	The development of relational processes between partners

The criticism on the structural perspective is mainly the narrow focus on single transactions and the emphasis that the initial structural design is crucial for the alliance performance (Faems et al., 2008; Hennart, 2006). The relational perspective focuses on the effect of multiple transactions to form interfirm relationship and emphasizes trust as a mechanism against opportunistic behaviour and contractual hazards (Jeffries & Reed, 2000). The criticism on the relational perspective is that trust possibly blinds a firm for opportunism against partners (Faems et al., 2008).

The main criticism on both perspectives is the limited focus on the structure of the transaction or the relational processes within the interfirm relationship. This implies that only minor attention is provided to the relation between these perspectives (Faems et al., 2008). Therefore, a discussion arises about the relationship between the structural and relational perspective. Numerous scholars have argued that empirical research is required to investigate the relation between these perspectives and between the governance mechanisms trust and contract (Faems et al., 2008; Madhok & Tallman, 1998). Nevertheless, whereas one research stream concluded that trust can form a substitute for contract, the second stream suggested that contract and trust are complementary (Faems, et al., 2008; Madhok, 1995).

In the first research stream trust forms a substitute for contract. Bradach and Eccles (1989) state that informal relational governance reduces the need for formal governance. Furthermore, “relational governance is more effective and efficient”, because the negotiation and control costs are lower and the level of flexibility is higher (Das & Teng, 1998; Faems, 2006 p. 39). Moreover, trust diminishes potential opportunistic thoughts while contracts can only protect partners against opportunism (Bradach & Eccles, 1989) and provide a signal of distrust (Ghoshal & Moran, 1996).

The second research stream found evidence that the two mechanisms are complementary in enhancing alliance success, because building an interfirm trust relationship or a complex contract is not sufficient (Poppo & Zenger, 2002; Ring & Van de Ven, 1994). As stated earlier, the contract is set up at the beginning of an interfirm relationship, but is not a mechanism to manage situations wherein mutual adaption is required. Customized contracts are likely to mitigate opportunistic behaviour and thereby support relational governance (Poppo & Zenger, 2002). Nevertheless, the results of the studies that have examined the relation between contract and trust are rather ambiguous. Despite, the ambiguous results concerning complementary of contract and trust, it is interesting to research whether trust and contract differ per contextual setting, like type of STA. In the following sub paragraph the factors influencing the governance mechanisms will be elaborated.

2.4.1 Factors influencing governance mechanisms

Research regarding governance mechanisms indentified various factors that may influence the governance decision. The 3 factors discussed in the subsequent paragraphs correspond to the variables influencing the ownership structures.

First, technology uncertainty can be determined by the technological sector the alliance is in (Santoro & McGill, 2005). Each sector can be classified in a certain technology level which implies that STAs in a high tech sector have a high technology uncertainty (Hagedoorn & Duysters, 2002; Santoro & McGill, 2005). According to transaction cost economics theory, organizations should try to diminish the effects of technological uncertainty by designing contractual safeguards (Williamson, 1985; Pisano, 1990). This implies that the level of technology influences the choice for contract complexity (Poppo & Zenger, 2002).

Second, the number of partners in the STA (dyadic or constellation) is mentioned as an influencing context variable towards the ownership structure. Garcia-Canal et al. (2003) argued that the number of partners in the STA influence the trust and contract complexity. In addition, constellations STAs need more contractual complexity to align the interests of a greater number of partners.

The final factor that can influence the level of trust and contract complexity is prior ties with partners within the current STA. Prior ties increase mutual understanding and create a higher level of trust, predictability and reliability among partners (Gulati, 1995a; Lavie & Rosenkopf, 2006). When trust exists in a STA, partners can benefit from contractual flexibility (Das and Teng, 1998). Parkhe (1993) found that prior ties between collaborating partners limits the perception of expected opportunistic behaviour in new alliances and lowers the contract complexity in terms of safeguards. This implies that prior ties influence governance mechanisms.

3 Hypotheses

To investigate the differences between explorative and exploitative STAs in relation to the ownership structure and governance mechanisms, this chapter outlines the hypotheses formulated.

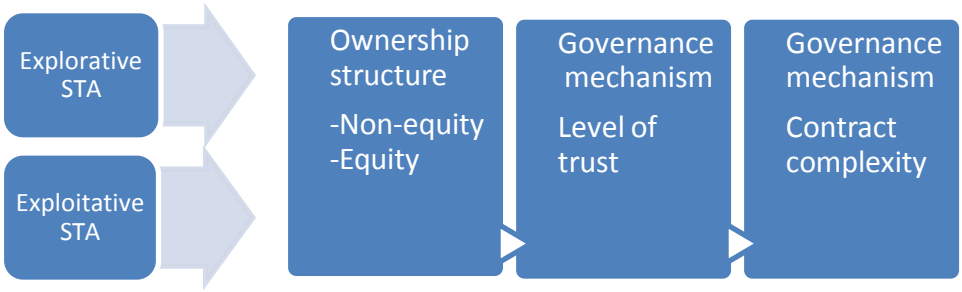
3.1 Type of STAs

Only recently academics began to realize that STAs are no homogeneous collection of interfirm arrangements and started to emphasize the unique governance challenges in the innovation trajectory (Doz & Williamson, 2002; Faems, 2006). By defining STAs as inter-organisational arrangements wherein at least 1 partners has the aim to develop a technology, partners still can have different motivations for engaging in a STA, namely "the motivation to exploit an existing capability or to explore for new opportunities" (Koza and Lewin, 1998: 256). Koza & Lewin (1998) introduced these differences between exploration and exploitation in the inter-organisational context by applying March's (1991) dichotomy of exploration and exploitation.

Further research of Koza and Lewin (2000), Park et al. (2002), Rothaermel (2001) and Lavie and Rosenkopf (2006) focused on the value chain function that Strategic Alliances serve. Strategic Alliances with research and development activities that lead to innovative technologies and applications can be typified as explorative STAs. Partners engage in upstream activities of the value chain, share tacit knowledge and develop new knowledge (Lavie & Rosenkopf, 2006). Organisations that rely on STAs for using existing technologies are exploitative STAs. These organisations engage in downstream activities, like commercialization, to leverage and combine partners "existing capabilities through exchanges of explicit knowledge" (Rothaermel, 2001 as cited in Lavie & Rosenkopf, 2006: p. 799). Explorative STAs search for "new knowledge, the use of unfamiliar technologies and the creation of products with unknown demand" (Greve, 2007:p. 1). Exploitative STA refers to "the use and refinement of existing knowledge, technologies and products and has more certain and proximate benefits" (Greve, 2007:p. 1).

Figure 3.1 contains the research model, including the governance key drivers and the different types of STAs. As stated in paragraph 2.4, governance consists of the level of trust and contract complexity. Therefore, these variables are illustrated separately in figure 3.1. The subsequent paragraphs will formulate the hypotheses per governance key driver.

Figure 3.1: Research model



3.2 Ownership structures in STAs

The hypotheses regarding the ownership structure will investigate whether a type of STA (i.e. explorative or explorative) as a whole is a condition for selecting a particular ownership structure (i.e. non-equity or equity).

Explorative STAs are characterised as collaborations wherein a set of activities are performed to create new knowledge, opportunities and technologies with unknown demand (Koza & Lewin, 1998; Greve, 2007). This implies that in explorative STAs the level of uncertainty is high and organisations face the problem of transferring and protecting tacit know-how (Gulati & Singh, 1998). From a transaction cost economics perspective, one could say that the greater the appropriation concerns and transaction costs involved, the more hierarchical ownership structure will be selected (Gulati, 1995a). On the other hand, from a real options perspective, one could say that "higher formation, organisation and dissolution costs make hierarchical governance less attractive" as technological uncertainty is high (Santoro & McGill., 2005: p. 1264). This would imply that partners prefer non-equity ownership structures to probe new technology applications in technology sectors, due to the flexibility, short term formation process and the relatively low level of commitment and coordination costs required (Duysters et al., 1999; Gulati & Singh, 1998; Santoro & McGill, 2005; Steensma & Corley, 2001). Following the line of reasoning of Duysters et al., (1999), Steensma & Corly (2001) and Santoro et al., (2005), hypothesis 1A is formulated.

> Hypothesis 1A: Explorative STAs are more likely to have an non-equity structure than exploitative STAs.

Exploitative STAs have the objective to "use, refine existing knowledge, technologies and products and have more certain and proximate outlooks for potential benefits" (Greve, 2007: p. 1; Koza & Lewin, 1998; Rothaermel & Deeds, 2004). Therefore, it is essential that the selected structure supports the transformation of knowledge and technology to create products or services (Bierly & Coombs, 2004; Kogut, 1989).

Especially an equity structure is able to support knowledge transformation, information sharing and learning capabilities without losing core propriety knowhow (Mowery, Oxley, & Silverman, 1996). An equity structure requires a high level of commitment, involves high coordination costs and partners engage in this structure for a longer period of time (Gulati & Singh, 1998). This also minimizes the risk of a STA partner losing core proprietary knowhow (Mowery et al., 1996). This would imply that an equity ownership structure would be more appropriate in an exploitative STA. Based on the stated differences between explorative and exploitative STAs regarding the equity ownership structure, hypothesis 1B is formulated.

Hypothesis 1B: Exploitative STAs are more likely to have an equity structure than explorative STAs.

3.3 Governance mechanisms in STAs

As stated earlier, it is debatable whether trust and contract governance are substitutes or complements for the governance of STAs. The hypotheses are focused on the difference between the structural (contract) and relational (trust) perspective across explorative and exploitative STAs.

Due to the activities (i.e. research, experimentation and improvisation) undertaken in the explorative STAs, the process is frequently unknown or rather uncertain (Cagliano et al., 2000). Furthermore, the technological risk and the failure rates are high. Research conducted by (Shah & Swaminathan, 2008) concluded that a high level of uncertainty for Strategic Alliances results in a low level of interpretability (transparency of output) and low process manageability (transparency of the process). In addition, Shah & Swaminathan (2008) found that if both interpretability and process manageability are low, trust is the most critical factor between alliance partners. Since a low level of process manageability and interpretability corresponds to the activities undertaken in the explorative STAs, it is expected that explorative STAs rely more on a relational governance mechanism than a structural mechanism. This line of reasoning corresponds to the findings of Gulati (1995a) and Zaheer, McEvily, & Perrone (1998). Gulati (1995a) argues that a rigid contract in the explorative STAs is a result of a leakage of trust. The activities and processes performed in this type of STA can be characterized as explorative and implicative and are difficult to capture in a contract. The contract can only be defined generically, since the aim, scope and final output are rather abstract (Cagliano, et al., 2000). Furthermore, a rigid contract can hamper the transfer and integration of knowledge, an activity that is essential for explorative STAs (Bierly & Coombs, 2004).

Zaheer et al.(1998) found that bargaining costs were lower when a high level of trust between organisations exists. SMEs that are involved in a STA frequently have no access to internal knowledge and assets to set up a rigid contract. In addition, for explorative STAs in a more uncertain setting it is complex to specify all relevant contingencies in a rigid contract and to enforce those legally (Carson et al., 2003). Therefore, a less complex contract and more trust based governance is expected for SME partners. Based on the findings of Shah & Swaminathan (2008), Gulati (1995a) and Zaheer et al. (1998), hypothesis 2A is formulated as follows:

Hypothesis 2A: Explorative STAs rely more on trust-based governance than exploitative STAs.

In exploitative STAs, partners transform the explored technology knowledge into products or services and focus on activities to reduce costs and standardize activities (Koza & Lewin, 1998; Rothaermel & Deeds, 2004). In exploitative STAs the focus is frequently long term, expectations can be set in advance and the activities require significant investments (Bierly & Coombs, 2004). Furthermore, exploitative STAs are considered as a single transaction strongly focused on the process outcomes. This implies that for each new product a new negotiation process starts. Based on these characteristics, Reuer & Ariño (2007) argue that a greater transaction-specific investment results in a higher level of contractual complexity. Koza & Lewin (1998; p260) stated that "the greater the exploration intent of an alliance, the greater the reliance on behaviour and process controls" and "the greater the exploitation intent of an alliance, the greater the reliance on output controls". This emphasises again that the control mechanisms in explorative STAs vary in their use from exploitative STAs. As a result, it is more likely that exploitative STAs rely more output controls, like contract-based governance. Hypothesis 2B is based on these findings.

Hypothesis 2B: Exploitative STAs rely more on contract-based governance than explorative STAs.

4 Research methodology

This chapter addresses the research strategy, validity and reliability and confidentiality. Furthermore, the operationalisation and the descriptive statistics per investigated variables are outlined.

4.1 Research strategy

To verify the theoretically derived hypotheses of this deductive study, a survey was developed (Gill & Johnson, 2006). To address the specific variables described in chapter 2 and 3, this study used a self administered questionnaire. A self administered questionnaire is a useful method to determine the variance of the selected variables quantitatively. Furthermore, this problem statement has only been studied in case studies. Academic researchers in this field of research have asked for additional studies to confirm earlier indications to gain a fine grained understanding (Faems, 2006). Finally, the influence of the researcher is minimal and this decreases the level of social bias, an issue also elaborated in paragraph 4.2 (Cooper & Schindler, 2006).

4.1.1 Data enquiry

To increase the reliability of results, it was important that the respondent was the entrepreneur or the general manager of the SME, since these persons are generally involved with decision making on a strategic level within the STA. To successfully contact these entrepreneurs, the member list of Port4Growth was consulted. Port4Growth is a platform that brings together entrepreneurs of SMEs to support them in organisational growth. The organization facilitates events to share knowledge and experiences. Although it could not be determined in advance if the entrepreneurs in this network are involved in STAs, the network of Port4Growth contains entrepreneurs who are involved in different sectors.

In total, 4 different events were visited to derive respondents, namely workshops in cooperation with Philips Applied Technology, regional events, “programma groeiversneller” and the High Growth Forum event. Participants were asked to complete the paper and pencil questionnaires in the presence of the researcher, during the break of these events. If the respondent was not able to finish the paper and pencil questionnaire, a stamped self-addressed envelope was handed over so that the respondent could return the questionnaire afterwards. If the questionnaire was not received within 2 weeks, the entrepreneur was called by the researcher to ask for the status. If the entrepreneur could not send the paper and pencil questionnaire, he or she was given the option to fill in a web survey. The web survey contains similar questions as the paper and pencil questionnaire. Participants of the High Growth Forum did only receive an invitation by email to complete the web survey and were phone called afterwards. During the telephone conversation the purpose of the study was explained to reduce misunderstandings and to increase the response rate.

4.1.2 Research sample

In total, 127 entrepreneurs were invited during the Port4Growth events (i.e. workshop and region events), 86 entrepreneurs were invited during “programma groeiversnellers” and 244 entrepreneurs were invited for the web survey. From the 457 entrepreneurs invited for this study, 40 STAs were applicable for analyses. According to Verschuren et al. (2007), this number of respondents is sufficient to draw external valid conclusions for quantitative research.

4.2 Reliability and validity

To limit mistakes in conducting research (i.e. bias), the following paragraphs address reliability and validity (Van Aken et al., 2007).

4.2.1 Reliability

The reliability of this study is high, because the outcomes were to a limited extent subject to influences of the researcher (Baarda & De Goede, 2001b; Babbie, 2007; Cooper & Schindler, 2006). In addition, each respondent had to answer similar questions with pre-specified answer categories. Moreover, the survey contained a filter modus that ensured respondents only answered questions relevant to their situation. To increase the reliability of the research instruments, variables were operationalized in a set of items, an issue addressed in paragraph 4.4. For example, the trust of a STA is measured with an 8 item scale. Furthermore, a Cronbach Alpha test was calculated to determine the internal consistency of the multiple-item answer scales. Each of these issues increased the reliability of the data enquiry process, research instruments and results (Van Aken et al., 2007).

4.2.2 Validity

Validity involves construct validity, internal validity and external validity (Van Aken, et al., 2007).

Construct validity is the extent to which a measuring instrument measures what it intends to measure and refers to the quality of the operationalisation (Van Aken, et al., 2007). Since the questions were adapted from earlier research conducted in peer reviewed journals, the construct validity can be considered high. The questionnaire was reviewed by 3 entrepreneurs, 3 academic students and the supervisor of this study before the data collection process started. The test panel was asked to focus on clarity and suggestive questions. Furthermore, practical objections, like sufficient space for writing and difficult linguistic terms, were addressed. Appendix A contains the Dutch questionnaire. Nevertheless, the closed answer categories ensured that respondents could not express their situation precisely and choose the best given option.

This could have influenced the construct validity negatively, because it is unknown whether a question is misunderstood by a respondent. Therefore, the majority of the questionnaires were completed in the presence of the researcher.

Internal valid research implies that conclusions about the relationship are justified and complete (Van Aken, et al., 2007). To justify conclusions, the research scope was narrowed to only STAs. Furthermore, only recent academic literature was examined to generate hypotheses and to verify possible relationships.

External validity refers to the generalisability of the results and conclusions to other people organisations, countries or situations (Van Aken, et al., 2007). The STAs examined were not randomly selected, nationally oriented and the research population is unknown. Therefore, the extent to which the results can be generalized to the population is limited (Baarda & De Goede, 2001b). Hence, this academic study is the first attempt on this specific research topic with a sample of 40 STAs.

4.3 Anonymity and confidentiality

To secure anonymity, several precautionary actions were followed. First, the questionnaire did not include questions about the personal situation of the respondent, only specifications about the STA. Second, respondents could optionally agree to provide their name and email address, but this was not required. Third, questionnaires distributed during the workshops were provided with a stamped self-addressed envelope that could be returned anonymously. Fourth, the web survey was distributed with assistance of the software tool Thesistools. Entrepreneurs could complete the questionnaire by clicking on an email send hyperlink and enter the questionnaire with a self chosen username. This also contributed to anonymity. Finally, the attendant introduction letter of the questionnaire referred to the aim of the study and informs the respondents about the confidentiality of results (see appendix A).

4.4 Operationalisation

This paragraph operationalises the variables: explorative and exploitative STAs, ownership structures and governance mechanisms. To ensure each variable can be measured in empirical research, the variables are operationalized in 1 or more underlying indicators (Baarda & De Goede, 2001a; Cooper & Schindler, 2006). Furthermore, this paragraphs addresses the measurement scale and the descriptive variables per question.

4.4.1 Strategic Technology Alliances:

To determine whether respondents were involved in STAs, 2 questions were set up that are based on the studies of (Cagliano, et al., 2000; Contractor & Lorange, 1988; Parkhe, 1993).

Both questions had the aim to filter out respondents that were not involved in STAs. Question 1 asked respondents if their organisation participated in a Strategic Alliance during the last 5 years. Question 9 aimed to reveal if at least 1 of the cooperative partners had the strategic objective to develop technology and is based on the definition of STAs maintained in this study (Sadowski & Duysters, 2008). In total, 40 STAs were selected for the analyses of this study.

4.4.2 Type of Strategic Technology Alliances

To define the difference in type of STA i.e. exploration and exploitation , question 14 was formulated (see table 4.1 and Appendix A). Question 14 is based on the definition of Greve (2007) and the exploration-exploitation dichotomy of March (1991) and Koza & Lewin (1998).

Table 4.1: Question 14 of the questionnaire

Question 14, Which of the following answers describes the alliance best?	
A	The alliance search for new knowledge, use of unfamiliar technologies, and creation of products with unknown demand
B	The alliance use and refinement of existing knowledge, technologies, and products, and has more certain and proximate benefits

Table 4.2 contains the frequency table for question 14, i.e. explorative and exploitative STAs. The total sample includes 40 STAs; 12 explorative STAs and 28 exploitative STAs. This unequal distribution could be related to the fact that the sample group are active entrepreneurs in the network of Port4Growth. These entrepreneurs might have already passed the start up phase and currently focus on exploitation instead of exploration activities. However, the unequal distribution complicates drawing generalisations about the STA differences.

Table 4.2: Frequency table questions 14

Question 14, Which of the following answers describes the alliance best?		Frequency	Percent
Valid	Explorative STA	12	30.0%
	Exploitative STA	28	70.0%
Total		40	100.0%

4.4.3 Ownership structures

The structure of a STA was determined by question 15. Table 4.3 illustrates that non-equity alliances are most often chosen. This is in line with the findings of Duysters et al. (1999) who investigated that the number of non-equity agreements increased from 10% of all alliances in 1970 towards 85 % in 1996. The equity structure (N=5) and Joint venture structures (N=7) are represented in 1 variable, namely equity structure.

Table 4.3: Frequency table question 15

15 What is the alliance structure?		Frequency	Percent
Valid	Non-equity structure	28	70.0%
	Equity Structure	12	30.0%
Total		40	100.0%

4.4.4 Governance mechanisms

As stated earlier, alliance governance is defined as the balance between the level of trust and the contract complexity. Both variables will be operationalized separately in the following paragraphs.

4.4.4.1 *Level of trust*

Carson, et al. (2003, p. 46) defined trust as "the confidence held by one party in its expectations of the behaviour and goodwill of another party regarding business actions". They operationalized trust as expectations for the fulfilment of obligations, mutuality, flexibility and information exchange, based on the findings of (Noordeweir, John, & Nevin, 1990; Zaheer, et al., 1998). In addition, they set up 8 statements that measure the extent to which norms of trust exist. This study used a similar operationalisation, as illustrated in table 4.4. However, the 7 points answer categories used in the study Carson et al. (2003) was rescaled to a 5 points scale to reduce complexity.

Table 4.4: Trust statements to measure the trust level (adopted from Carson et al. (2003))

20 Code the following eight statements to which extent the alliance is accurate described.	
20 a	The parties held mutual expectations about the contractor's responsibilities that went beyond what was specified in out formal agreements.
20 B	The parties expected that conflicts would be resolved fairly, even if no guidelines were given by our formal agreements.
20 C	There were performance goals for the contractor's work that were understood and accepted by the parties even though they were not written in our formal agreements.
20 D	When an unexpected situation arose, the parties had a mutual understanding that a win-win solution would be found, even if it contradicted our formal agreements
20 E	Both parties were expected to share helpful information to an extent beyond that required by our formal agreements
20 F	The parties held mutual expectations that each would be flexible and responsive to requests by the other, even if not obliged by our formal agreements.
20 G	Both parties were understood that problems arising during the relationship would be solved jointly trough communication and cooperation rather than just reference to our formal agreements.
20 H	Both parties understood that each would adjust to changing circumstances even if not bound to change by formal agreements

Table 4.5 contains the descriptive statistics for all 8 items together. The answer scale represents a completely inaccurate description with a 1 and answer category '5' represents a completely accurate description. Respondents scored trust between 2.88 and 5, with an average score of 3.98. This implies that the level of trust in the sample is relatively high when the differences in STA type are not taken into consideration. Appendix B illustrates the descriptive statistics per item. The reliability of the scale is tested by a Cronbach's alpha and the Cronbach's Alpha value is 0,857 without removing any item (i.e. question 20a-20h).

Table 4.5: Descriptive statistics of the 8 trust items together.

	N	Minimum	Maximum	Mean	Std. Deviation	Cronbach's Alpha
Trust on 5 point scale	40	2,88	5,00	3,9845	0,51019	0,857
Valid N (listwise)	40					

4.4.4.2 *Contract complexity*

To gain insights in the governance of the STAs, especially the contract complexity is an important variable. Therefore, the contractual safeguards were examined. Faems (2006) and Parkhe (1993) stated that the more contractual clauses are specified, the more complex the alliance contract. Therefore, contract complexity is operationalized by the number and specificity of contractual clauses. The level of contract complexity was assessed with a list of 7 contractual safeguards with the answer possibility: yes, no and unknown. The safeguards are arranged in a presumed order (A to H) of increasing stringency and were adapted from the study of Parkhe (1993) (see table 4.6).

Table 4.6: Contractual clauses for operationalise contract complexity (adapted from Parkhe (1999))

22 Which safeguards were included in the formal agreement of the alliance?	
22 A	Periodic written reports of all relevant transactions
22 B	Prompt written notice of any departures from the agreement
22 C	The right to examine and audit all relevant records through a firm of CPAs
22 D	Designation of certain information as proprietary and subject to confidentiality pro-visions of the contract
22 E	Non-use of proprietary information even after termination of agreement
22 F	Termination of agreement
22 G	Arbitration clauses
22 H	Lawsuit provisions

For each of the safeguards a corresponding value was assigned. For example, the first safeguard had a value of '1' in case the respondent answered 'yes', the fourth value '4', and so on. If a safeguard could not be assigned, the value is '0'.

A composite index was computed as $\sum i$ (total safeguard values)/36, wherein the denominator is the summation of all i (i = 8)(Parkhe, 1993). This creates a contract complexity index from 0.0 to 1.0. The index ranges the value from 0.0 to 1.0. '0' represents no complex contract and the value '1' represents very complex contracts (see table 4.7). In the sample 4 cases were excluded, because the respondent filled in the answer category 'unknown'.

Table 4.7: Frequency table contract complexity on 0.0-1.0 scale

	N	Minimum	Maximum	Mean	Std. Deviation
Contract complexity on 0,0-1,0 scale	36	0,00	1,00	0,5995	0,33783
Valid N (listwise)	36				

4.4.5 Control variables

As stated in chapter 2, there are different factors that might influence the ownership structure and governance mechanisms. To draw conclusions regarding the differences of explorative and exploitative STAS and the ownership structure, trust and contract, the influencing factors (i.e. number of partners involved, prior ties and level of technology) are used as control variables. Control variables are held constant in an attempt to clarify further the relationship between two other variables (Babbie, 2007) and are operationalized in the subsequent paragraphs.

4.4.5.1 *Number of partners involved in the STA*

The structure of a STA is determined by the number of organisations involved and the ownership structure. Question 7 revealed the number of organisations involved and determined if the STA had a dyadic (2 organisations) or constellation STA (3 or more organisations). Table 4.8 shows that dyadic STAs represent 55% of alliances and constellation STAs represent 45% of all examined alliances.

Table 4.8: Frequency table question 7

7 How many organisations are involved in this alliance?		Frequency	Percent
Valid	Dyadic STA (2 organisations)	22	55.0%
	Constellation STA (3+ organisations)	18	45.0%
Total		40	100.0%

4.4.5.2 *Prior ties*

Partner uncertainty refers to the prior ties with an alliance partner (Santoro & McGill, 2005). Question 10 measures the prior ties of the described STA by the presence or absence of any prior ties with the earlier selected STA partners. Presence is coded as '0' and the absence of prior ties with alliance partners is coded as '1' . Table 4.9 shows that 27.5 % of the respondents had prior ties with at least 1 of the partners of the described STA.

Table 4.9: Frequency table question 10

10 Did your organisation had prior ties with the mentioned partners of this STA?		Frequency	Percent	Cumulative percent
Valid	Prior alliances with mentioned partner(s)	11	27.5%	27.5%
	No prior alliances with mentioned Partner(s)	29	72.5%	100.0%
Total		40	100.0%	

4.4.5.3 *Level of technology*

The level of technology can be determined by the technological subfield of the alliance (Santoro & McGill, 2005). Since this study focuses on multiple sectors, the operationalisation of the technological uncertainty corresponds to the sector the technology is developed for. In high technology sectors, the technological uncertainty is higher than in a low technology sector (Hagedoorn & Duysters, 2002). Table 4.10 outlines the sectors included in the sector. The sectors food and beverages, metal, oil and gas are coded as low tech (1). The instrumentation, automotive, chemicals or plastics sectors are coded as medium tech (2). If the respondent states the STA is active in the sectors drugs, IT, Aerospace or defence, the technology is coded as high technology (3) (Hagedoorn, 1993; Hagedoorn & Duysters, 2002). Table 4.10 shows that 7 STAs are active in the low technology sectors, 4 STAs are active in the medium technology sectors and 21 STAs in a high tech sectors. In total, 8 STAs did not specify a sector.

Table 4.10: Frequency of the sector the STA is active in question 11

11 In which sector is the STA active in?		Frequency	Percent	Cumulative percent
Valid	Food and beverages	6	15.0%	15.0%
	Metals	1	2.5%	17.5%
	Instrumentation	2	5.0%	22.5%
	Automotive	1	2.5%	25.0%
	Chemicals/plastics	1	2.5%	27.5%
	Drugs	1	2.5%	30.0%
	Information Technology	20	50.0%	80.0%
	Different, specify	8	20.0%	100.0%
Total		**40**	**100.0%**	

Question 13 asks respondents directly to classify the technology developed in the STA in low, medium or high technology. The outcomes are outlined in table 4.11 and show a comparable distribution for low and high technology as in table 4.10. The 8 respondents who could not classify the sector the technology developed were all classified as medium technology.

In this way, the classification corresponds with the outcomes of question 11. For the analyses of this study, 2 levels of technology are used for describing the STAs; low and high technology. These extremes are useful to find clear differences and increases the chance the respondent classifies the technology correctly. The sub category medium technology is merged with low technology (see figure 4.12).

Table 4.11: Frequency table question 13

13 What is the level of technology in the STA?		Frequency	Percent	Cumulative percent
Valid	Low technology	5	12.5%	12.5%
	Medium technology	13	32.5%	45.0%
	High technology	22	55.0%	100.0%
Total		40	100.0%	

Table 4.12: Distribution of low and high technology STAs

13 What is the level of technology in the STA?		Frequency	Percent
Valid	Low technology	18	45.0%
	High technology	22	55.0%
Total		40	100.0%

5 Results

The results are structured around the investigated variables and formulated hypotheses. Figure 5.1 contains an overview of the examined relations that will be elaborated in paragraph 5.1 and 5.2. Table 5.1 contains an overview of the empirically investigated variables.

Figure 5.1: Empirically investigated relations

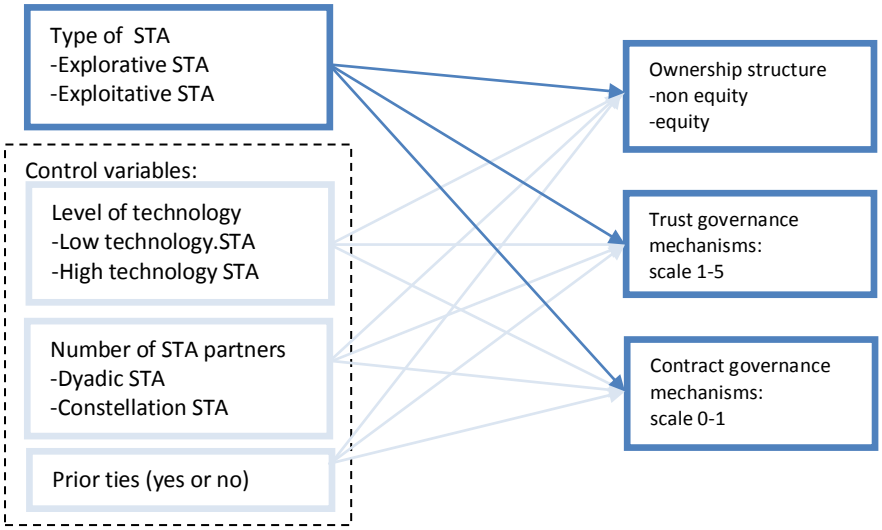


Table 5.1: Summary of the results

Type of STA	Governance key drivers	Category/scale	Test	Sig.	§
1 Explorative STA **2 Exploitative STA**	**Ownership structure**	1 Non-equity 2 Equity	Chi square	**0.763**	**5.1**
	Trust governance	1-5 scale	Independent T-test	**0.478**	**5.2**
	Contract governance	0-1 scale	Independent T-test	**0.031****	**5.2**

**= $p < 0.05$

5.1 Results on ownership structures

The descriptive statistics are examined and a chi-square test is applied to determine whether a difference exists between ownership structures across explorative and exploitative STAs. Figure 5.2 illustrates the analysed variables. Subsequently, the control variables are analysed to investigate whether the type of STA, level of technology, number of partners and prior ties affect the ownership structure.

Figure 5.2: Chi-Square test ownership structures

Hypothesis 1A & B: rejected

Based on the findings of Duysters et al.(1999), Gulati and Singh (1998), Mowery et al.(1996), Santoro and McGill (2005), Steensma and Corly (2001) it is expected that SMEs in the explorative STAs rely more on non-equity ownership structure than exploitative STAs (hypothesis 1A) and exploitative STAs rely more on equity ownership structure than explorative STAs (hypothesis 1B). Despite the lower representation of explorative STAs, table 5.2 indicates that a non-equity ownership structure is selected in 66.7% of the examined explorative STAs. Exploitative STAs choose in 71.4% of the cases for non-equity ownership structures. Furthermore, explorative STAs rely more on non-equity ownership structures than equity ownership structures. However, the results regarding the equity structure are contrary to our expectations that exploitative STAs rely more on equity ownership (see table 5.2).

Table 5.2: Frequency of ownership structures per type of STA

15 What is the alliance ownership structure?		Frequency	Percent	Total percent	Cumulative Percent
Explorative STA					
Valid	Non-equity structure	8	66.7%	20.0%	20.0%
	Equity structure	4	33.3%	10.0%	30.0%
	Total	12	100.0%		
Exploitative STA					
Valid	Non-equity structure	20	71.4%	50.0%	80.0%
	Equity structure	8	28.6%	20.0%	100.0%
	Total	28	100.0%		
Total		40	100.0%	100.0%	

To investigate the existing differences between explorative and exploitative STAs and ownership structure, a Chi-square analysis is applied. The results of the Chi-square analysis indicate that there is no significant difference between type of partner and ownership structure (see table 5.3). This implies that the differences in ownership structure across the type of STAs are insufficient to indicate a significant difference. Therefore, hypothesis 1A & 1B are rejected.

Table 5.3: Results Chi-Square towards the type of STAs and ownership structures

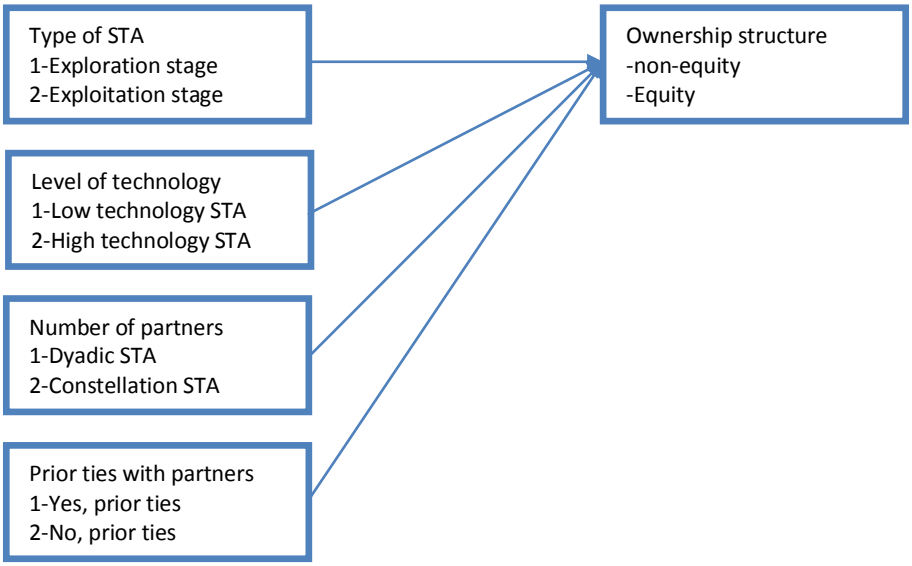
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,091[a]	1	,763		
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,090	1	,765		
Fisher's Exact Test				1,000	,521
Linear-by-Linear Association	,088	1	,766		
N of Valid Cases	40				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3,60.
b. Computed only for a 2x2 table

Based on the stated factors that influence the ownership structure in paragraph 2.3.4, the control variables type of STA, level of technology, number of partners, prior ties are selected. These control variable will be analysed to measure influence on the ownership structure as stated by earlier research (Garcia-Canel, Baldes-Llaneza & Arino, 2003; Gulati, 1995b; Gulati & Singh, 1998; Pateli, 2009; Santoro & McGill, 2005; Reuer & Arino, 2007). In figure 5.3 the investigated relations between the control variables and ownership structure are illustrated.

Figure 5.3: The investigated relation control variable and ownership structure variable relation



The influence of the control variables on the ownership structure is analysed with a binary logistic regression. A binary logistic regression tests how the control variables affect the ownership structures (Cooper et al., 2006). As stated by Das and Teng (2008), "Logistic regression can be used to test structural choices between equity alliances and non-equity alliances" (p.733). The outcomes of the binary logistic regression analysis are outlined in table 5.3 and appendix C. It can be concluded that the control variable number of partners (i.e. dyadic or constellation) significantly affects the ownership structure ($p<0.1$). In other words, dyadic STAs more often select an equity ownership structure (B= -1.624) than constellations chose for an equity ownership structure. However, it is noteworthy that equity ownership structures represent 30% of the sample.

Table 5.3: Results binary logistic regression ownerships structure

Results binary logistic regression Ownership structure

		B	(S.E.)	Sig.	Exp(B)
Step 1	Type of STA	-0,05	0,80	0,95	0,95
	Level of technology	-0,61	0,77	0,43	0,54
	Number of partners	-1,62	0,92	0,08*	0,20
	Prior ties	-0,95	0,98	0,33	0,39
	Constant	4,04	2,79	0,15	56,83

(-2 log likelihood) 43.69, (Cox & Snell) 0,12, (Nagelkerke) 0,17. * P<0.1
Ownership structure dependent variable encoding : 0 non-equity & 1 equity
Number of partners independent encoding: 1 dyadic & 2 constellation

5.2 Results on governance mechanisms

It is hypothesised that explorative STAs rely more on the relational governance mechanism whereas exploitative STAs rely more on the structural governance mechanism (contract).

Hypothesis 2A: rejected

In hypothesis 2A it was expected that explorative STAs rely more on trust-based governance (relational governance) than exploitative STAs. Figure 5.4 outlines the investigated relation between the type of STA and level of trust.

Figure 5.4: Relation between type of STAs and trust governance mechanism

Based on the descriptive statistics in table 5.4 it can be concluded that explorative STAs have a higher level of trust in the partners they cooperate with in comparison to the exploitative STAs. However, the mean differences between explorative and exploitative STAs are rather small.

Table 5.4: Descriptive statistics of trust governance per type of STA

Type of STA	Level of trust	N	Minimum	Maximum	Mean	Std. Deviation
Explorative STA	Trust in 8 items on 5 point scale	12	3,38	4,62	4,0733	,36960
Exploitative STA	Trust in 8 items on 5 point scale	28	2,88	5,00	3,9464	,56153
Total all types of STAs	Valid N (listwise)	40	2,88	5,00	3,9845	,51019

By conducting an independent T-test the mean differences of the level of trust amongst the explorative and exploitative STAs is analysed. The results of the independent T-test are illustrated in table 5.5 and 5.6. It can be concluded that there is no significant difference between the type of STAs and level of trust. Therefore, hypothesis 2A is rejected.

Table 5.5: Level of trust across the type of STA

Group Statistics

	Type of STA	N	Mean	Std. Deviation	Std. Error Mean
Trust level on 5 point scale	explorative	12	4,0733	,36960	,10669
	exploitative	28	3,9464	,56153	,10612

Table 5.6: Results independent T-test for level of trust across the type of STA

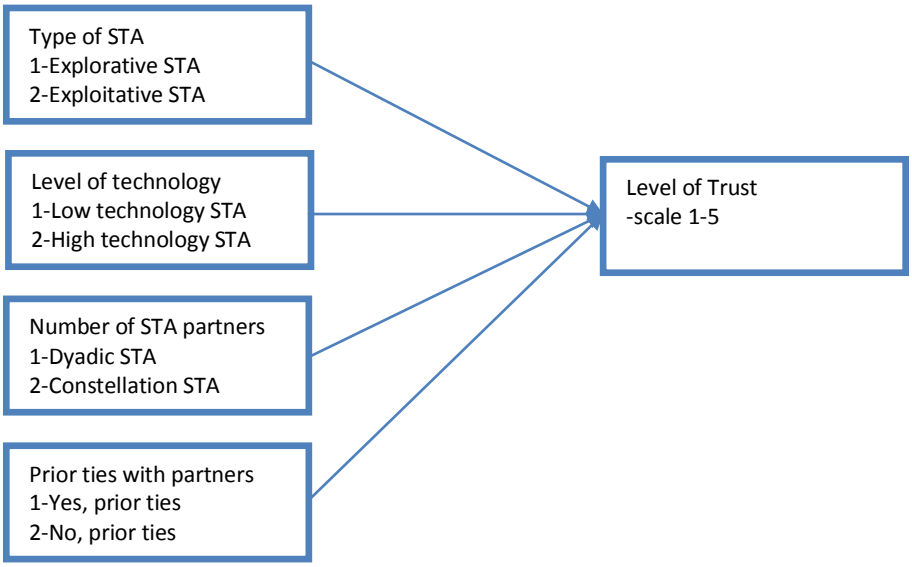
Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Trust level on 5 point scale	Equal variances assumed	2,211	,145	,716	38	,478	,12690	,17714	-,23170	,48551
	Equal variances not assumed			,843	31,121	,405	,12690	,15048	-,17996	,43376

Control variables towards the level of trust

As stated in paragraph 2.4.1, it is expected that the type of STA, level of technology, number of partners, prior ties influence the trust governance mechanism (Das & Teng, 1998; Garcia-Canal et al., 2003; Gulati, 1995a; Parkhe 1993; Poppo & Zenger, 2002). Figure 5.5 illustrates the investigated relations between the control variables and trust governance mechanism.

Figure 5.5: Context variables in relation with trust governance



To measure the influence of the stated control variables on the level of trust, a linear regression analysis is applied. In table 5.7 and Appendix D the results of the analysis are illustrated. The R-squared is .09, which indicates that only 9% of the variation in the level of trust can be declared by the control variables. This low R-squared indicates that the influence on the selected control variables is minimal and no significant relation can be found. This finding will be further elaborated in paragraph 6.2.

Table 5.7: Results linear regression analysis

Results linear regression level of trust

Model		B	Std. Error	Beta
1	(Constant)	4,80	0,58	
	Type of STA	-0,10	0,18	-0,10
	Level of technology	0,11	0,17	0,11
	Number of partners	-0,17	0,18	-0,17
	Prior ties	-0,33	0,20	-0,29

a. Dependent Variable: Trust level on 5 point scale, R^2=,09.

Hypothesis 2B: supported

Hypothesis 2B assumed that exploitative STAs rely more on contract-based governance than explorative STAs. Figure 5.5 outlines the tested relation between type of STAs and contract complexity.

Figure 5.5: Relation between type of STAs and contract governance mechanisms

To measure the differences in contract complexity a scale between 0-1 is used, as described in sub paragraph 4.4.4.2. Table 5.8 illustrates the mean differences in contract complexity per type of STA. It can be concluded that the contract complexity in exploitative STAs is higher than in the explorative STAs.

Table 5.8: Descriptive statistics of contract complexity governance per type of STA.

Type of STA	Contract complexity	N	Minimum	Maximum	Mean	Std. Deviation
Explorative STA	Contract complexity	11	0,03	0,75	,4192	0,25563
Exploitative STA	Contract complexity	25	0,00	1,00	,6789	0,34313
Total All type of STAs	Valid N (listwise)	36	0,00	1,00	,5995	0,33783
Excluded	Data unknown by respondent	4				

To measure a significant difference between type of STA and contract complexity, an independent T-test was applied. Based on the results of this test (see tables 5.9 and 5.10), it can be concluded that there is a significant difference between contract complexity in explorative and exploitative STAs ($p < 0.05$). In other words, exploitative STAs rely more on contract based governance than exploitative STAs. Consequently, hypothesis 2B is supported. Chapter 6 will elaborate this finding.

Table 5.9: Contract governance mechanism per type of STA

Group Statistics

	Type of STA	N	Mean	Std. Deviation	Std. Error Mean
Contract complexity on 0-1 scale	explorative	11	,4192	,25563	,07708
	exploitative	25	,6789	,34313	,06863

Table 5.10: Results independent T-test

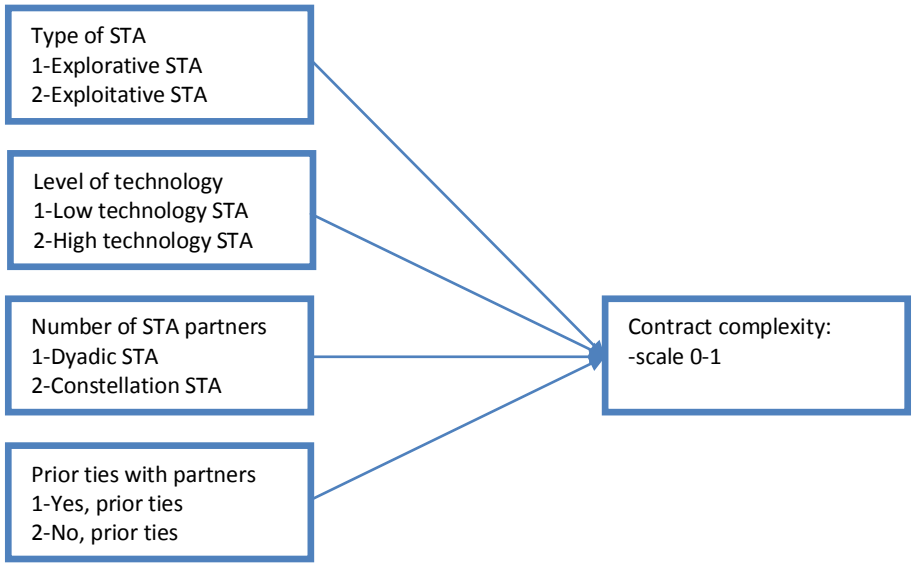
Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Contract complexity on 0-1 scale	Equal variances assumed	2,890	,098	-2,244	34	,031	-,25970	,11574	-,49491	-,02448
	Equal variances not assumed			-2,516	25,470	,019	-,25970	,10320	-,47204	-,04735

Control variable towards contract complexity

As mentioned in sub paragraph 2.4.1, it is expected that the type of STA, level of technology, number of partners and prior ties influence the contract governance mechanism (Das and Teng, 1998; Garcia-Canal et al., 2003; Gulati, 1995a; Parkhe, 1993; Poppo & Zenger, 2002). Figure 5.6 illustrates the investigated relations between the control variables and contract complexity.

Figure 5.6: Context variables in relation with contract complexity



To analyse the influence of the control variables on contract complexity, a linear regression analysis is applied. The results of the linear regression analysis are illustrated in table 5.11 and Appendix E. The R-square is ,30 which implies that 30% of the variation in the contract complexity can be declared by the investigated control variables.

This indicates that the type of partner has a significant influence on contract complexity (P<0.01). In conclusion, the mean contract complexity scale increases with 30 % for exploitative STAs. This finding is elaborated in chapter 6.

Table 5.11: Results of the linear regression analysis towards contract complexity.

Results linear regression Contract complexity

Model		B	Std. Error	Beta
1	(Constant)	0,28	0,35	
	Type of STA	0,30	0,11	0,42*
	Level of technology	-0,14	0,11	-0,21
	Bi-/multilateral STA	-0,16	0,12	-0,24
	Prior ties	0,15	0,13	0,21

Dependent Variable: Contract complexity on 0-1 scale, R^2= .30, * P< 0,01

6 Discussion

This study is conducted to determine the differences in terms of ownership structures and governance mechanisms between explorative and exploitative STAs in order to contribute to the knowledge of governance challenges in STAs. To answer this question, a literature study is conducted wherein the key drivers of the governance alliance life cycle phase were examined and the types of STAs were determined. Subsequently, hypotheses were formulated and tested empirically. This chapter contains the conclusions, discussion and suggestions for further research.

6.1 General conclusion

Based on the findings of Faems (2006), Kale and Singh (2009) and Koza & Lewin (1998) the aim was to determine *'What are the differences in terms of ownership structure, trust and contract complexity between explorative and exploitative Strategic Technology Alliances?'*

In conclusion, this study has found that the contract complexity is significantly higher in exploitative STAs than in explorative STAs. However, no difference in ownership structure and trust between explorative and exploitative STAs was found. The following sub paragraphs answer the main research question per investigated variable. Paragraph 6.2 will discuss the research results and will put forward suggestions future research can take into account to elaborate this debatable research topic.

6.1.1 Ownership structures

By investigating 2 types of ownership structures, i.e. equity alliances and non-equity alliances, this study had the aim to determine whether the ownership structure differs between explorative and exploitative STAs. This study has found that the number of STA partners can influence the ownership structure, namely dyadic STAs more often select an equity structure than constellation STAs do, an issue elaborated in paragraph 6.2. However, no significant difference between the selected ownership structures and the type of STAs could be found. The majority of the STAs in this study had selected a non-equity structure in both explorative and exploitative STAs. This implies that STAs can be best characterized as homogeneous collaborations instead of heterogeneous collaborations wherein the type of STA as a whole is a condition for selecting a particular ownership structure.

Although this is contrary to the formulated hypothesis regarding ownership structures for SMEs, this is in line with the findings of Duysters et al. (1999). Duysters et al. (1999) found that all type of organizations that engage in STAs more often choose for a non-equity structure. An underlying reason can be that this type of ownership structure is usually short-term, rather flexible, requires smaller investments and can be negotiated rapidly in comparison with equity ownership structures (Bierly & Coombs, 2004; Gulati, 1995a; Hagedoorn, 1993).

By selecting this type of ownership structure, SMEs become capable to enhance their competitive advantage and internal R&D efforts rapidly.

6.1.2 Governance mechanisms

This study has found a significant difference in contract complexity between explorative and exploitative STAs. It has been found that the type of STA has a significant influence on the contract complexity which entails that exploitative STAs have a significantly higher contract complexity. Earlier research suggested that the increase of contract complexity might be related to the need to align and to stimulate knowledge transfer and integration, due to the leakage of trust (Bierly & Coombs, 2004; Das & Teng, 1998). Nevertheless, the mean level of trust in explorative STAs is slightly higher than in exploitative STAs, but is not significantly different per type of STA. This thought is not confirmed in this study, because the level of trust remained equal in the different types of STA. Finally, the control variables investigated did not significantly affect the level of trust.

Based on these findings it can be implied that SMEs use extra contractual safeguards in exploitative STAs and are more aware of opportunistic behavior, an issue also addressed in the transaction cost economics perspective (Gulati, 1995a; Williamson, 1985). Furthermore, this finding suggests that a more structural perspective is preferred in exploitative STAs.

6.2 Discussion and suggestions for further research

This study is a step forwards in empirically verifying the indication that explorative and exploitative STAs require unique governance challenges and various findings remain open for discussion.

First, by using findings, variables and indications concluded or used in earlier studies in the fields of Strategic (Technology) Alliances, R&D Alliances and Technology Collaborations, this study has combined earlier findings from these fields in 1 study. Furthermore, the alliance life cycle variables are applicable to all types of Strategic Alliances so that future research can easily include additional phases of the alliance life cycle and expand this study by including additional SMEs.

Second, this study has investigated the influence of prior ties on ownership structure, level of trust and contract complexity. Even though earlier studies were able to find a relation between these variables, this study was not able to find a significant relation. To a certain extent this might be related to the small sample of 40 STAs wherein only 11 STAs had prior ties with 1 of the STA partners. In addition, the majority of the focal STAs were active in the IT sector. However, the study of Pateli (2009) was also conducted in the IT sector and found that STAs with a longer alliance history raise preference for equity alliances. Another underlying reason might be that this study did not examine whether the prior STA was successful or not.

It might be that successful prior STAs influence the governance key drivers differently than unsuccessful STAs (Li & Rowley, 2002), an issue that can be addressed by future research.

Third, no significant relation between the level of technology and the governance key drivers was found, contrary to the findings of (Santoro & McGill, 2005). Santoro and McGill (2005:p. 1264) found that "higher technology uncertainty reduces the likelihood that a more hierarchical governance form will be used." Following the transaction cost economics perspective, organisations aim to diminish the effects of technological uncertainty by designing contractual safeguards (Williamson, 1985; Pisano, 1990) and this implies that a higher of level of technology influences the choice for contract complexity (Poppo & Zenger, 2002). A possible explanation for not finding this relation can be related to the definition of technology uncertainty. Technology uncertainty can be related to the technological subfield the STA is active in. Otherwise, one can identify the specific uncertainties related to 1 or more sectors the study is conducted in, like Santoro & McGill (2005) did. In this way, the uncertainties involved with the technology developed are better described and a stronger focus on the technology objectives is created.

Fourth, this study has found that the number of partners significantly influence the ownership structure and dyadic STAs more often select an equity ownership structure than constellation STAs do. According to García-Canal et al. (2003), the number of partners affect the complexity to manage alliances. Following the transaction cost economics perspective, alliances with multiple partners more often select an equity ownership structure to protect the partners involved against partner misbehavior (Gulati, 1995a; García-Canal, 1996 and Oxley, 1997). It is expected that this contrary finding is related to the investment required for SMEs to engage in an equity ownership structure. Furthermore, this finding is in line with the indications that the use of an equity ownership structure is declining and SMEs rely more on non-equity ownership structures in explorative and exploitative STAs. Underlying reasons for this increase are the level of flexibility, the short term formation process and the relatively low level of commitment and coordination costs required (Bierly & Coombs, 2004, Gulati & Singh, 1998; Steensma & Corley, 2001; Duysters et al., 1999; Santoro & McGill, 2005).

Fifth, this study analysed the differences in governance mechanisms (i.e. level of trust and contract complexity) across explorative and exploitative STAs. Although this study was not able to find a relation between these governance mechanisms, it is found that contract complexity is significantly higher in exploitative STAs. It is advisable that future research not only examines the relation between the relational and structural perspective, but also examines the dynamics between these variables for both the Strategic (Technology) Alliance and the SMEs involved in the partnership (Koza and Lewin, 1998). By investigating these dynamics on alliance and on organisational level, one can gain better insights in the relation between the relational and structural perspective and determine how contextual, competitive and organisational factors influence these perspectives (Koza and Lewin, 1998; Poppo and Zenger, 2002).

Although this study was carried out in a quantitative and empirical manner, this study has various limitations. First, the sample size of 40 usable STAs is rather limited to be able to generalize findings and to find significant results. By including more Dutch SMEs, future research might be able to find significant relations and draw conclusions applicable to the total population of Dutch SMEs. Second, this study has collected data from just 1 alliance partner. Ideally, all partners of the STA are included to increase the accuracy and degree of correspondence per STA. Third, the definition of contract complexity is rather limited. (Woolthuis, Hillebrand, & Nooteboom, 2005) stated that contract governance should shift the attention towards the actual content of the contract clauses, the intentions behind the contract and the actual use of the contract. Fourth, this study did not measure the performance of the alliances. Therefore, conclusions regarding successful governance choices cannot be drawn. Furthermore, the impact of these governance choices per type of STA on the innovation performance also remains unclear.

6.2.1 Suggestions for further research

Learning from experience and investing in alliance specific governance challenges supports organisations in increasing their alliance success rate and innovative potential (Draulans et al., 2003; Duysters & De Man, 2005). Consequently, future research is recommended to continue examining the research stream focused on in this study in order to contribute to the success rate and innovative potential of future STAs. Especially a largely similar study including a larger sample of Dutch SMEs may have the potential to identify the type of STA differences this study was unable to discover.

To contribute towards the knowledge of alliance management, future research is well advised to define a clear research scope. According to Duysters & De Man (2005), it does not make sense to investigate different types of alliances without defining this difference.

One can better define a specific type of alliance or a certain type of organisation, like has been done in this study, so that the understanding alliances have on innovation becomes more fine grained (Duysters & De Man, 2005). Especially the focus on SMEs could deliver a valuable contribution to the research stream of STAs, since SMEs represent more than 90% of all European organisations. In addition, future research can improve the capabilities of SMEs to compete successfully in today's turbulent business environment (Hoffmann and Schlosser, 2001).

To increase the success rate of a STA, SMEs should manage all the phases in the alliance life cycle effectively and efficiently (Schreiner, et al. 2009). Kale and Singh (2009) developed this conceptual model as a construct for future research on Strategic Alliances. Although this study has selected 1 phase of the alliance life cycle, the detailed skills to manage these phases are still incomplete when only investigating 3 variables in 1 phase. Consequently, it is advisable that future research investigates the required skills for SMEs per phase of the alliance life cycle to increase the understanding of the governance challenges and supplement the model of Kale and Singh (2009).

Another suggestion for future research is based on the vast increase of non-equity ownership structures STAs select. If SMEs select a non-equity ownership structure, it becomes more complicated to align interests and to stimulate knowledge transfer and integration, due to the leakage of trust partners have in each other. Mainly the absence of hierarchical and ownership control ensures that organisations use rigid contractual control mechanisms. Consequently, research regarding non-equity alliances is recommended to focus on the level of trust SMEs have in their STA partners. More specifically, it is advised to investigate how SMEs can increase the level of trust in case hierarchical and ownership control is relatively low. Therefore, research towards the influencing context variable trust would be valuable.

Appendix A: Dutch questionnaire

Enquête strategische allianties

Beste ondernemer,

Port4Growth is het kenniscentrum, van en voor groeiondernemers. Port4Growth wil daarom continue in gesprek zijn met haar partners en ondernemers. Binnen Port4Growth werken wij veel samen met afstudeer-studenten om op verschillende groeithema's kennis te blijven vergaren.

Momenteel studeert David Sala bij Port4Growth af vanuit de Universiteit Twente met een onderzoek naar strategische allianties. Dit onderzoek heeft als doel succesvolle kenmerken van strategische allianties te achterhalen. Met een strategische alliantie wordt een formele samenwerking bedoeld met bijvoorbeeld klanten, leveranciers en kenniscentra. De reden van dit onderzoek is de lage slagingspercentage (30%) van allianties onder bedrijven met 5 tot 500 werknemers.

Alle gegevens worden vertrouwelijk behandeld en zullen niet aan derden worden verstrekt. De onderzoeksresultaten worden verwerkt in een scriptieonderzoek in opdracht van Port4Growth en de Universiteit Twente. De uitkomsten van het onderzoek worden gepubliceerd op de website van Port4Growth.

De enquête bestaat uit twee delen. In deel één worden vragen gesteld over uw organisatie met betrekking tot strategische allianties en in deel twee over één specifieke strategische alliantie waarin u betrokken bent (geweest).

Het invullen van de vragenlijst neemt ongeveer 10 minuten in beslag.

Alvast bedankt voor uw medewerking!

Met vriendelijke groet,

David Sala

Projectmedewerker Port4Growth
Student aan de Universteit Twente

Retouradres:
Port4Growth
Postbus 8505
3503 RM Utrecht
david.sala@port4growth.nl

Deel 1

1. Is uw bedrijf de afgelopen 5 jaar ooit betrokken geweest in een strategische alliantie? Reken ook de strategische allianties mee die vandaag nog operationeel zijn.
(*Met een strategische alliantie, wordt een formeel samenwerkingsverband tussen onafhankelijke organisaties bedoeld.)*

- ❑ Nee Einde vragenlijst
- ❑ 1 alliantie
- ❑ Meer dan 1, namelijk: ……..

2. Bedrijfsgegevens

   Bedrijfsnaam: ……..

   Branche: ……..

   Aantal werknemers: ……

3. Gegevens respondent

   Functie: ……

Deel 2 (alliantie 1)

Selecteer één van de strategische allianties waarin uw bedrijf betrokken is (geweest) en beantwoord de volgende vragen over de structuur van de alliantie.

4. In welk jaar is de alliantie gestart?

   Jaartal: ……..

5. Uit hoeveel partners bestaat de alliantie?

   Aantal: …

6. Hoe kunt u de volgende alliantiepartners het beste typeren?

		Universiteit	Onderzoekscentrum	Concurrent	Klant	Leverancier	overheid	Anders	
a)	Uw eigen organisatie	❒	❒		❒	❒	❒	❒	*, namelijk:*……
b)	Alliantie partner 1	❒	❒	❒	❒	❒	❒	❒	*, namelijk:*……
c)	Alliantie partner 2	❒	❒	❒	❒	❒	❒	❒	*, namelijk:*……
d)	Alliantie partner 3	❒	❒	❒	❒	❒	❒	❒	*, namelijk:*……
e)	Alliantie partner 4	❒	❒	❒	❒	❒	❒	❒	*, namelijk:*……
f)	Alliantie partner 5	❒	❒	❒	❒	❒	❒	❒	*, namelijk:*……
g)	Alliantie partner 6	❒	❒	❒	❒	❒	❒	❒	*, namelijk:*……

7. Heeft u of tenminste één van de (bij vraag 6) beschreven partners het strategische doel om Technologie te ontwikkelen?

   ❑ Ja

   ❑ Nee

8. Is er één van de (bij vraag 6) beschreven partners buiten Nederland gevestigd?

   ❑ Ja

   ❑ nee

9. Met welke van de (bij vraag 6) beschreven partners bent u een eerdere alliantie mee aangegaan?

- ❑ Geen eerdere alliantie met de beschreven partners aangegaan
- ❑ Alliantie partner 1
- ❑ Alliantie partner 2
- ❑ Alliantie partner 3
- ❑ Alliantie partner 4
- ❑ Alliantie partner 5
- ❑ Alliantie partner 6

10. Strategische allianties kunnen verschillende doestellingen nastreven. Geef aan hoe belangrijk onderstaande doelstellingen waren voor de alliantie op het moment dat de overeenkomst werd getekend?

		Erg onbelangrijk	Onbelangrijk	Neutraal	Belangrijk	Erg belangrijk	Niet van toepassing
a)	Verlagen kosten d.m.v. schaalvoordeel	❑	❑	❑	❑	❑	❑
b)	Betreden nieuwe markt in dezelfde sector	❑	❑	❑	❑	❑	❑
c)	Betreden nieuwe markt in een andere sector	❑	❑	❑	❑	❑	❑
d)	Ontwikkelen nieuwe technologie	❑	❑	❑	❑	❑	❑
e)	Concurrenten dwarsbomen	❑	❑	❑	❑	❑	❑
f)	Nakomen overheidseisen	❑	❑	❑	❑	❑	❑
g)	Ontwikkelen nieuwe vaardigheden	❑	❑	❑	❑	❑	❑
h)	Risico spreiding	❑	❑	❑	❑	❑	❑

11. In welke sector opereert deze alliantie?

Kruis het antwoord aan dat het <u>meest</u> van toepassing is.

- ❑ levensmiddelen
- ❑ Metaal
- ❑ Olie en gas
- ❑ Instrumentatie
- ❑ Automobiel
- ❑ Chemicaliën/plastics
- ❑ Medicijnen
- ❑ Informatie technologie
- ❑ Lucht- en/of ruimtevaart
- ❑ Defensie
- ❑ Anders, namelijk:……

12. Hoe zou u de mate van technologie in de alliantie beschrijven?

- ❑ Laag (low-tech)
- ❑ Gemiddeld (medium-tech)
- ❑ Hoog (high-tech.)

13. Welke van de onderstaande antwoordmogelijkheden beschrijft de activiteiten van de alliantie het beste?

- ❑ Het zoeken naar nieuwe kennis, gebruik van onbekende technologie en/of het creëren van producten of diensten met een nog onbekende marktvraag.
- ❑ Het gebruiken en verfijnen van bestaande kennis, technologie en/of producten of diensten.

14. Wat is de structuur waarop u de alliantie bent aangegaan?

- ❑ **Equity strategic alliance,** zijn partnerships waarbij bedrijven een aandeelhoudersrelatie aangaan. Voorbeelden van equity-allianties zijn strategische minder- of meerderheidsdeelnemingen.
- ❑ **Non-equity strategic alliance,** zijn contractuele samenwerkingsverbanden waarbij de partners samenwerken en enkel aan elkaar verbonden zijn door middel van een contract.
- ❑ **Joint venture alliantie structuur,** waarbij twee onafhankelijke organisatie eigenaar worden van een nieuw gecreëerde organisatie.

15. Welke van de onderstaande technologische activiteiten is dominant in deze alliantie?

- ❑ Vervaardigen van onderzoeksprototypes die de haalbaarheid van de technologie aantonen
- ❑ Vervaardigen van industriële prototypes die klanten kunnen gebruiken voor het testen van de technologie
- ❑ Vervaardigen van gestandaardiseerde producten
- ❑ Niet van toepassing

16. Welke van de onderstaande antwoordmogelijkheden is het meest van toepassing op de alliantie, met betrekking tot commerciële activiteiten?

- ❑ Nog geen commercieel doeleinde
- ❑ In overleg met toekomstige klanten en/of verkoop naar eerste klanten
- ❑ Verkoop op grote schaal
- ❑ Niet van toepassing

17. In welke fysieke setting wordt er binnen de alliantie gewerkt?

- ❑ Laboratorium/studieomgeving
- ❑ Testomgeving
- ❑ Productieomgeving
- ❑ Niet van toepassing

18. Welke van de onderstaande antwoordmogelijkheden sluit het beste aan bij uw alliantie?

- ❑ Activiteiten die gericht zijn op het creëren van nieuwe kennis
- ❑ Activiteiten die gericht zijn op het toepassen van kennis om nieuwe producten of processen tot stand te brengen
- ❑ Het omzetten van materialen, arbeid, informatie naar een kennisrijk product
- ❑ Niet van toepassing

De volgende vragen gaan over de samenwerking binnen de alliantie.

19. Geef aan in welke mate de volgende beschrijvingen de alliantie accuraat beschrijven.

		Zeer mee oneens	*Mee oneens*	*Neutraal*	*Mee eens*	*Zeer mee eens*
a)	Iedere alliantiepartner heeft wederzijdse verwachtingen over de verantwoordelijkheden van de partner.	❒	❒	❒	❒	❒
b)	De wederzijdse verwachtingen gaan verder dan in de formele overeenkomst is gespecificeerd.	❒	❒	❒	❒	❒
c)	Iedere alliantiepartner verwacht dat conflicten eerlijk zullen worden opgelost, ondanks dat hier geen regels voor zijn opgesteld in de formele overeenkomst.	❒	❒	❒	❒	❒
d)	Indien een onverwachte situatie zich doet, heeft iedere alliantiepartner een wederzijds begrip om een win-win oplossing te vinden, zelfs als het de formele overeenkomsten dit tegenspreekt.	❒	❒	❒	❒	❒
e)	Van alle alliantiepartners wordt verwacht dat nuttige informatie gedeeld wordt in een mate die verder gaat dan voorgeschreven is in de formele overeenkomst.	❒	❒	❒	❒	❒
f)	Iedere alliantiepartner heeft wederzijdse verwachtingen dat partner(s) flexibel en ontvankelijk zijn voor verzoeken van andere partners, zelfs als deze niet verplicht zijn gesteld door de formele overeenkomsten.	❒	❒	❒	❒	❒
g)	Alle alliantiepartners begrijpen dat de problemen die ontstaan tijdens een alliantie gezamenlijk opgelost kunnen worden door communicatie en samenwerking in plaats van enkel het verwijzen naar de formele overeenkomsten.	❒	❒	❒	❒	❒
h)	Alle alliantiepartners begrijpen dat ze zich moeten aanpassen aan veranderingen in omstandigheden, zelfs als dit niet is opgelegd door de formele overeenkomst.	❒	❒	❒	❒	❒

De volgende vragen gaan over het contract van de alliantie.

20. Wat is de totale lengte van het initiële contract?

    …. pagina's

21. Welke van de onderstaande bepalingen zijn opgenomen in het initiële contract?

		Ja	Nee	Onbekend
a)	Periodiek geschreven rapporten van alle relevante transacties	❒	❒	❒
b)	Een tijdig (geschreven) berichtgeving bij het afsluiten/beëindigen van de overeenkomst	❒	❒	❒
c)	Het recht om alle relevante bedrijfsgegevens via een accountant te bestuderen en verifiëren	❒	❒	❒
d)	Benoeming van bepaalde informatie als bedrijfsgebonden en onderworpen aan de vertrouwelijkheidsbepalingen van het contract	❒	❒	❒
e)	Niet-gebruik van Bedrijfsgebonden informatie, zelfs niet na beëindiging van de overeenkomst	❒	❒	❒
f)	Beëindiging van de overeenkomst	❒	❒	❒
g)	Clausules voor arbitrage	❒	❒	❒
h)	Juridische proces bepalingen	❒	❒	❒

22. Wat is volgens u de functie van het getekende alliantiecontract?

    U kunt meerdere antwoorden selecteren.

    ❒ Coördinatie
    ❒ Instrument voor wettelijke bescherming
    ❒ Bescherming tegen onvoorziene omstandigheden
    ❒ Teken van wederzijds commitment

De volgende vragen gaan over de prestatie van de alliantie.

23. In hoeverre bent u tevreden is over de resultaten van deze alliantie?

- ❑ Zeer ontevreden
- ❑ Ontevreden
- ❑ Gematigd
- ❑ Tevreden
- ❑ Zeer tevreden

24. Hoe denkt u dat de strategische doelstellingen van uw organisatie zijn behaald in relatie tot deze alliantie?

		Erg matig	Matig	Normaal	Goed	Erg goed	N.V.T.
a)	Verlagen kosten d.m.v. schaalvoordeel	❑	❑	❑	❑	❑	❑
b)	Betreden nieuwe markt in dezelfde sector	❑	❑	❑	❑	❑	❑
c)	Betreden nieuwe markt in een andere sector	❑	❑	❑	❑	❑	❑
d)	Ontwikkelen nieuwe technologie	❑	❑	❑	❑	❑	❑
e)	Concurrenten dwarsbomen	❑	❑	❑	❑	❑	❑
f)	Nakomen overheidseisen	❑	❑	❑	❑	❑	❑
g)	Ontwikkelen nieuwe vaardigheden	❑	❑	❑	❑	❑	❑
h)	Risico spreiding	❑	❑	❑	❑	❑	❑

25. Bestaat de alliantie nog steeds?

- ❑ Ja — Ga door naar vraag 29
- ❑ Nee — Ga door naar de volgende vraag

26. In welk jaar is de alliantie beëindigd?

Jaartal: ……..

27. Was de beëindiging van de alliantie gepland?

- ❑ Ja, de doelen waren bereikt — Ga door naar vraag 29
- ❑ Nee, de beëindiging was niet gepland — Ga door naar de volgende vraag

28. Met welke reden is de alliantie beëindigd?

- ❑ Gebrek aan technisch raakvlak
- ❑ Gebrek aan organisatie raakvlak
- ❑ Gebrek aan financiële middelen.
- ❑ Gebrek aan commitment
- ❑ Verandering in uw prioriteiten en/of strategie
- ❑ Gebrek aan vertrouwen
- ❑ Acquisitie heeft plaats gevonden, partner heeft u of u heeft de partner overgenomen.
- ❑ Anders, namelijk ……

29. Is er gedurende de alliantie over het initiële contract heronderhandeld?

- ❑ Nee
- ❑ Ja, licht de reden hiervan kort toe:……..

  ……..

  ……..

30. Mocht ik naar aanleiding van deze enquête nog vragen hebben, mag ik dan contact met u opnemen?

- ❑ Nee
- ❑ Ja, mijn gegevens zijn: Naam: ……
  Email: …… en/of
  Tel: ……

Hartelijk dank voor het invullen van de vragen.

David Sala

david.sala@port4growth.nl

Eventuele opmerkingen en/of vragen met betrekking tot strategische allianties kunt u in onderstaand veld plaatsen.

…… …… …… ……

Appendix B: Governance Mechanisms

This appendix outlines the descriptive statistics for the 8 trust items per type of STA.

Table 1: Descriptive statistics of trust items in question

		N	Minimum	Maximum	Mean	Std. Deviation
a)	The parties held mutual expectations about the contractor's responsibilities that went beyond what was specified in out formal agreements.	40	2	5	4,07	0,616
b)	The parties expected that conflicts would be resolved fairly, even if no guidelines were given by our formal agreements.	40	2	5	3,90	0,810
c)	There were performance goals for the contractor's work that were understood and accepted by the parties even though they were not written in our formal agreements.	40	2	5	3,85	0,736
d)	When an unexpected situation arose, the parties had a mutual understanding that a win-win solution would be found, even if it contradicted our formal agreements	40	2	5	3,90	0,709
e)	Both parties were expected to share helpful information to an extent beyond that required by our formal agreements	40	3	5	4,15	0,622
f)	The parties held mutual expectations that each would be flexible and responsive to requests by the other, even if not obliged by our formal agreements.	40	2	5	3,87	0,853
g)	Both parties were understood that problems arising during the relationship would be solved jointly trough communication and cooperation rather than just reference to our formal agreements.	40	2	5	4,12	0,757
h)	Both parties understood that each would adjust to changing circumstances even if not bound to change by formal agreements	40	3	5	4,00	0,641
	Valid N (listwise)	40				

Appendix C: Binary logistic regression analysis on ownership structure

Dependent variable	Variable outcomes	Coding scheme in data set
Ownership structure	Non-equity	1
	Equity	2
Context variables	**Variable outcomes**	**Coding scheme in data set**
Type of STA	Explorative	1
	Exploitative	2
Level of technology	Low	1
	High	2
Number of partners	Dyadic STA	1
	Constellation STA	2
Prior	Prior ties with STA partner(s)	1
	No Prior ties with STA partner(s)	2

Table 1

Dependent Variable Encoding

Original Value	Internal Value
Non-equity	0
Equity	1

Table 2

Classification Table[a,b]

	Observed		Predicted		
			Non-equity or Equity structure?		Percentage Correct
			Non-equity	Equity	
Step 0	Non-equity or Equity structure?	Non-equity	28	0	100,0
		Equity	12	0	,0
	Overall Percentage				70,0

a. Constant is included in the model.
b. The cut value is ,500

Table 3

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-,847	,345	6,030	1	,014	,429

Table 4

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Type of STA	,091	1	,763
		Level of technology	1,231	1	,267
		Number of partners	2,771	1	,096
		Prior ties	,293	1	,589
	Overall Statistics		4,856	4	,302

Table 5

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	5,175	4	,270
	Block	5,175	4	,270
	Model	5,175	4	,270

Table 6

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	43,694[a]	,121	,172

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than ,001.

Table 7

Classification Table[a]

	Observed		Predicted		
			Non-equity or Equity structure?		Percentage Correct
			Non-equity	Equity	
Step 1	Non-equity or Equity structure?	Non-equity	27	1	96,4
		Equity	10	2	16,7
	Overall Percentage				72,5

a. The cut value is ,500

Table 8

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Type of STA	-,050	,795	,004	1	,950	,952
	Level of technology	-,610	,767	,632	1	,427	,544
	Dyadic-/constellation STA	-1,624	,916	3,139	1	,076	,197
	Prior ties	-,951	,975	,951	1	,329	,386
	Constant	4,040	2,794	2,090	1	,148	56,833

a. Variable(s) entered on step 1: question14, question13a, question7a, Partneruncertaintydefinitief.

Appendix D: Linear regression analysis on level of trust

Dependent variable	Variable outcomes	Coding scheme in data set
Ownership structure	Non-equity	1
	Equity	2
Context variables	**Variable outcomes**	**Coding scheme in data set**
Type of STA	Explorative	1
	Exploitative	2
Level of technology	Low	1
	High	2
Number of partners	Dyadic STA	1
	Constellation STA	2
Prior	Prior ties with STA partner(s)	1
	No Prior ties with STA partner(s)	2

Table 1

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Is there any prior alliances with mentioned partners of this alliance?, Type of STA, Low or High technology STA?, Number of partners[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: Trust level on 5 point scale

Table 2

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,297[a]	,088	-,016	,51420

a. Predictors: (Constant), Is there any prior alliances with mentioned partners of this alliance?, Which of the following answers describes the alliance best, Low or High technology STA?, Number of partners?

Table 3

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,897	4	,224	,848	,504[a]
	Residual	9,254	35	,264		
	Total	10,151	39			

a. Predictors: (Constant), Is there any prior alliances with mentioned partners of this alliance?, Type of STA?, Low or High technology STA?, Number of partners?
b. Dependent Variable: Trust level on 5 point scale

Table 4

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4,799	,579		8,289	,000
	Type of STA	-,104	,180	-,095	-,581	,565
	Level of technology	,112	,169	,111	,662	,512
	Number of partners	-,172	,177	-,170	-,975	,336
	Prior ties	-,325	,200	-,288	-1,623	,114

a. Dependent Variable: Trust level on 5 point scale

Appendix E: Linear regression analysis on contract complexity

Dependent variable	Variable outcomes	Coding scheme in data set
Ownership structure	Non-equity	1
	Equity	2
Context variables	**Variable outcomes**	**Coding scheme in data set**
Type of STA	Explorative	1
	Exploitative	2
Level of technology	Low	1
	High	2
Number of partners	Dyadic STA	1
	Constellation STA	2
Prior	Prior ties with STA partner(s)	1
	No Prior ties with STA partner(s)	2

Table 1

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Is there any prior alliances with mentioned partners of this alliance?, Type of STA?, Low or High technology STA?, dyadic or constellation STA[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Contract complexity on 0-1 scale

Table 2

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,546[a]	,298	,207	,30083

a. Predictors: (Constant), Is there any prior alliances with mentioned partners of this alliance?, Type of STA, Low or High technology STA?, dyadic or constellation STA

Table 3

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,189	4	,297	3,285	,023[a]
	Residual	2,805	31	,090		
	Total	3,994	35			

a. Predictors: (Constant), Is there any prior alliances with mentioned partners of this alliance?, Type of STA? Low or High technology STA?, Number of partners?

b. Dependent Variable: Contract complexity on 0-1 scale

Table 4

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	,284	,350		,812	,423
	Type of STA	,303	,111	,418	2,725	,010
	Level of technology	-,142	,107	-,211	-1,328	,194
	Number of partners	-,163	,117	-,241	-1,394	,173
	Prior ties	,150	,126	,207	1,183	,246

a. Dependent Variable: Contract complexity on 0-1 scale

References

Alm, H., & McKelvey, M. (2000). When and why does cooperation positively or negatively affect innovation? An exploration into turbulent waters. *CRIC Discussion Papers*, 39.

Awazu, Y. (2006). Managing technology alliances: The case for knowledge management. *International Journal of Information Management*, 26(6), 484-493.

Baarda, D., & De Goede, M. (2001). Basisboek methoden en technieken. Handleiding voor het opzetten en uitvoeren van onderzoek. Groningen: Stenfert Kroese.

Babbie, E. (2007). *The practice of social research*: Wadsworth Pub Co.

Bierly, P. & Coombs, J. (2004). Equity alliances, stages of product development, and alliance instability. *Journal of Engineering and Technology Management*, 21(3), 191-214.

Blau, P. (1964). Exchange and power in social life. *New York Wiley*, 78(118), 32,363-366.

Bleeke, J., & Ernst, D. (1995). Is your strategic alliance really a sale? *Harvard Business Review*, January-February, 97-105.

Bradach, J., & Eccles, R. (1989). Price, authority, and trust: From ideal types to plural forms. *Annual review of sociology*, 15(1), 97-118.

Cagliano, R., Chiesa, V., & Manzini, R. (2000). Differences and similarities in managing technological collaborations in research, development and manufacturing: a case study. *Journal of Engineering and Technology Management*, 17(2), 193-224.

Carson, S., Madhok, A., Varman, R., & John, G. (2003). Information processing moderators of the effectiveness of trust-based governance in interfirm R&D collaboration. *Organization Science*, 14(1), 45-56.

Contractor, F., & Lorange, P. (1988). Why should firms cooperate? The strategy and economics basis for cooperative ventures. Cooperative strategies in international business: joint ventures and technology partnerships between firms, 3-28.

Cooper, D. R., & Schindler, P. S. (2006). *Business Research Methods* (ninth edition ed.): McGraw-Hill

Culpan, R., & Kostelac, E. (1993). Cross-national corporate partnerships: trends in alliance formation. Multinational Strategic Alliances, *International Business Press*, 103–122.

Das, T.K, & Teng, B. (1998). Between trust and control: developing confidence in partner cooperation in alliances. *Academy of management Review*, 23(3), 491-512.

Das, T.K, & Teng, B. (2000). Instabilities of strategic alliances: An internal tensions perspective'. *Organization Science*, 11: 77-101.

Das, T.K, & Teng, B. (2001). Trust, control, and risk in strategic alliances: An integrated framework. *Organization studies*, 22(2), 251-283.

Das, T.K, & Teng, B. (2002). Alliance constellations: a social exchange perspective. *Academy of Management Review*, 27: 445-456.

De Man, A., & Duysters, G. (2005). Collaboration and innovation: a review of the effects of mergers, acquisitions and alliances on innovation. *Technovation*, 25(12), 1377-1387.

Doz, Y., & Williamson, P. (2002). Alliances as Entrepreneurship Accellerators. In F. J. Contractor, & P. Lorange. *Cooperative strategies and alliances*. Amsterdam: Pergamon.

Draulans, J., deman, A., & Volberda, H. (2003). Building Alliance Capability: Management Techniques for Superior Alliance Performance. *Long Range Planning*, 36(2), 151-166.

Duysters, G., Kok, G., & Vaandrager, M. (1999). Crafting successful strategic technology partnerships. *R and D Management*, 29(4), 343-351.

Faems, D. (2006). Collaboration for innovation: processes of governance and learning in R & D alliances. *Unpublished doctoral dissertation*, Katholieke Universiteit Leuven.

Faems, D., Janssens, M., Madhok, A., & Van Looy, B. (2008). Toward an integrative perspective on alliance governance: Connecting contract design, trust dynamics, and contract application. *The Academy of Management Journal* (AMJ), 51(6), 1053-1078.

García-Canal, E. (1996). Contractual form in domestic and international strategic alliances. *Organization Studies*, 17(5), 773.

García-Canal, E., Valdés-Llaneza, A., & Ariño, A. (2003). Effectiveness of dyadic and multi-party joint ventures. *Organization Studies*, 24(5), 743.

Ghoshal, S., & Moran, P. (1996). Bad for practice: A critique of the transaction cost theory. *Academy of management Review*, 21(1), 13-47.

Gill, J., & Johnson, P. (2006). *Research methods for managers* (third Edition ed.). London: Sage Publications Ltd.

Greve, H. (2007). 'Exploration and exploitation in product innovation'. *Industrial and Corporate Change.*

Gulati, R. (1995a). Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Academy of Management Journal*, 38(1), 85-112.

Gulati, R. (1995b). Social structure and alliance formation patterns: A longitudinal analysis. *Administrative science quarterly*, 40(4).

Gulati, R. (1998). Alliances and networks. *Strategic Management Journal*, 19(4), 293-317.

Gulati, R., & Singh, H. (1998). The Architecture of Cooperation: Managing Coordination Costs and Appropriation Concerns in Strategic Alliances. *Administrative science quarterly*, 43(4), 781-784.

Hagedoorn, J. (1993). Understanding the rationale of strategic technology partnering: interorganizational modes of cooperation and sectoral differences. *Strategic Management Journal*, 14(5), 371-385.

Hagedoorn, J. (2002). Inter-firm R&D partnerships: an overview of major trends and patterns since 1960. *Research policy*, 31(4), 477-492.

Hagedoorn, J., & Duysters, G. (2002). External sources of innovative capabilities: the preference for strategic alliances or mergers and acquisitions. *Journal of management studies*, 39(2), 167-188.

Hagedoorn, J., & Narula, R. (1996). Choosing organizational modes of strategic technology partnering: international and sectoral differences. *Journal of International Business Studies*, 27(2), 265-284.

Hennart, J. (2006). Alliance Research: Less is More*. *Journal of management studies*, 43(7), 1621-1628.

Hoffmann, W., & Schlosser, R. (2001). Success factors of strategic alliances in small and medium-sized enterprises an empirical survey. *Long Range Planning*, 34(3), 357-381.

Jeffries, F., & Reed, R. (2000). Trust and adaptation in relational contracting. *Academy of management Review*, 25(4), 873-882.

Kale, P., & Singh, H. (2009). Managing Strategic Alliances: What Do We Know Now, and Where Do We Go From Here? *The Academy of Management Perspectives* (formerly The Academy of Management Executive), 23(3), 45-62.

Kale, P., Singh, H., & Perlmutter, H. (2000). Learning and protection of proprietary assets in strategic alliances: Building relational capital. *Strategic Management Journal*, 21(3), 217-237.

Kogut, B. (1989). The stability of joint ventures: Reciprocity and competitive rivalry. *The Journal of Industrial Economics*, 38(2), 183-198.

Kogut, B. (1991). Joint ventures and the option to expand and acquire, Management Science 37(1): 19-33.

Kogut, B., and U. Zander 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. Organization Science, 3: 383-397.

Koza, M., & Lewin, A. (1998). The co-evolution of strategic alliances. *Organization Science*, 9(3), 255-264.

Koza, M., & Lewin, A. (2000). Managing partnerships and strategic alliances: raising the odds of success. *European Management Journal*, 18(2), 146-151.

Lavie, D., & Rosenkopf, L. (2006). Balancing exploration and exploitation in alliance formation. *Academy of Management Journal*, 49(4), 797.

Li, S. X., & Rowley, T. J. 2002. Inertia and evaluation mechanisms in interorganizational partner selection: Syndicate formation among U.S. investment banks. *Academy of Management Journal*, 45: 1104–1119.

Lyons, B., & Mehta, J. (1997). Contracts, opportunism and trust: self-interest and social orientation. *Cambridge journal of economics*, 21(2), 239.

Madhok, A. (1995). Opportunism and trust in joint venture relationships: an exploratory study and a model. *Scandinavian Journal of Management*, 11(1), 57-74.

Madhok, A., & Tallman, S. (1998). Resources, transactions and rents: managing value through interfirm collaborative relationships. *Organization Science*, 9(3), 326-339.

March, J. (1991). Exploration and exploitation in organizational learning. Organization Science, 2(1), 71-87.

McGee, J., Thomas, H. &Wilson, D., (2005). *Strategy: Analysis & Practice*. Third Edition. London: McGraw-Hill Education.

Mitchell, W., Dussauge, P., & Garrette, B. (2002). Alliances with competitors: how to combine and protect key resources? *Creativity and Innovation Management*, 11(3), 203-223.

Mowery, D., Oxley, J., & Silverman, B. (1996). Strategic alliances and interfirm knowledge transfer. *Strategic Management Journal*, 17(1), 77-91.

Narula, R. (2004). R&D collaboration by SMEs: new opportunities and limitations in the face of globalisation. *Technovation*, 24(2), 153-161.

Narula, R., & Hagedoorn, J. (1999). Innovating through strategic alliances: moving towards international partnerships and contractual agreements. *Technovation*, 19(5), 283-294.

Noordeweir, T., John, G., & Nevin, J. (1990). Performance Outcomes of Purchasing Arrangements in Marketing Channels: A Theoretical Perspective. *Journal of Marketing*, 54, 80-93.

Ohmae, K. (1989). The global logic of strategic alliances. *Harvard Business Review*, 67(March-April), 143-154.

Osborn, R., & Baughn, C. (1990). Forms of interorganizational governance for multinational alliances. *Academy of Management Journal*, 33(3), 503-519.

Oxley, J. (1997). Appropriability hazards and governance in strategic alliances: A transaction cost approach. Journal of Law, *Economics, and Organization*, 13(2), 387.

Park, S. H., Chen, R., & Gallagher, S. (2002). Firm resources as moderators of the relationship between market growth and strategic alliances in semiconductor start-ups. *The Academy of Management Journal*, 45(3), 527-545.

Parkhe, A. (1991). Interfirm Diversity, Organizational Learning, and Longevity in Global Strategic Alliances. *Journal of International Business Studies*, 22(4).

Parkhe, A. (1993). Strategic alliance structuring: A game theoretic and transaction cost examination of interfirm cooperation. *Academy of Management Journal*, 36(4), 794-829.

Parkhe, A. (1999). Building trust in international alliances. *Journal of World Business*, 33(4), 417-437.

Pateli, A. (2009). DECISION-MAKING ON GOVERNANCE OF STRATEGIC TECHNOLOGY ALLIANCES. *Management Decision*, 47(2), 246-270.

Pateli, A., & Giaglis, G. (2007). Governance contingencies for strategic technology alliances: a case in wireless business. *International Journal of Technology Management*, 40(4), 310-329.

Pisano, G. (1989). Using equity participation to support exchange: Evidence from the biotechnology industry. *Journal of Law, Economics, and Organization*, 5(1), 109.

Pisano, G. (1991). The governance of innovation: Vertical integration and collaborative arrangements in the biotechnology industry* 1. *Research policy*, 20(3), 237-249.

Pisano, G. P. (1990). The R&D boundaries of the firm: an empirical analysis. *Administrative science quarterly*, 35(1).

Poppo, L., & Zenger, T. (2002). Do formal contracts and relational governance function as substitutes or complements? *Strategic Management Journal*, 23(8), 707-725.

Puranam, P., & Vanneste, B. (2009). Trust and governance: Untangling a tangled web. *The Academy of Management Review* (AMR), 34(1), 11-31.

Reuer, J., & Ariño, A. (2007). Strategic alliance contracts: Dimensions and determinants of contractual complexity. *Strategic Management Journal*, 28(3), 313.

Ring, P., & Van de Ven, A. (1994). Developmental processes of cooperative interorganizational relationships. *Academy of management Review*, 19(1), 90-118.

Rothaermel, F. T. (2001). Incumbent's advantage through exploiting complementary assets via interfirm cooperation. *Strategic Management Journal*, 22(6 7), 687-699.

Rothaermel, F. & Deeds, D. Exploration and exploitation alliances in biotechnology: a system of new product development. *Strategic Management Journal*, 25 (3), 201-221.

Sadowski, B., & Duysters, G. (2008). Strategic technology alliance termination: An empirical investigation. *Journal of Engineering and Technology Management*, 25(4), 305-320.

Santoro, M., & McGill, J. (2005). The effect of uncertainty and asset co-specialization on governance in biotechnology alliances. *Strategic Management Journal*, 26(13), 1261-1269.

Schreiner, M., Kale, P., & Corsten, D. (2009). What really is alliance management capability and how does it impact alliance outcomes and success? *Strategic Management Journal*, 30(13), 1395-1419.

Shah, R., & Swaminathan, V. (2008). Factors influencing partner selection in strategic alliances: the moderating role of alliance context. *Strategic Management Journal*, 29(5), 471-494.

Spekman, R., Forbes, T., Isabella, L., & MacAvoy, T. (1998). Alliance management: a view from the past and a look to the future. *Journal of management studies*, 35(6), 747-772.

Steensma, H., & Corley, K. (2001). Organizational context as a moderator of theories on firm boundaries for technology sourcing. *Academy of Management Journal*, 44(2), 271-291.

Teece, D. (1992). Competition, cooperation, and innovation:: Organizational arrangements for regimes of rapid technological progress. *Journal of Economic Behavior & Organization*, 18(1), 1-25.

Teng, B., & Das, T.K. (2008). Governance structure choice in strategic alliances. *Management Decision*, 46(5), 725-742.

Tether, B. (2002). Who co-operates for innovation, and why: An empirical analysis. *Research policy*, 31(6), 947-967.

Williamson, O. (1981). The Economics of Organization: The Transaction Cost Approach. *The American Journal of Sociology*, 87, (3), 548-577.

Williamson, O. (1985). The Economic Institutions of Capitalism (1985). New York: Free Press.

Woolthuis, R., Hillebrand, B., & Nooteboom, B. (2005). Trust, contract and relationship development. *Organization Studies*, 26(6), 813.

Van Aken, J., Berends, H., & van der Bij, H. (2007). *Problem-solving in organizations: a methodological handbook for business students*: Cambridge Univ Pr.

Yoshino, M., & Rangan, U. (1995). Strategic alliances: an entrepreneurial approach to globalization: *Harvard Business Press*.

Zaheer, A., McEvily, B., & Perrone, V. (1998). Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance. *Organization Science*, 9(2), 141-159.

Zollo, M., Reuer, J. and Singh, H. (2002) Interorganizational routines and performance in strategic alliances. *Organization Science*, 13, 701–713.