Management control in joint ventures: an analysis based on transaction cost economics and game theory

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Executive summary
This paper addresses the question what determines management control in joint ventures. The model developed for this purpose draws on two existing frameworks. The first, by Dekker (2004), shows how control in strategic alliances can be structured around two control problems, coordination of tasks and appropriation concerns, the latter stemming from transaction cost economics theory. Dekker thereby differentiates between formal controls and the role of trust. The second framework, by Zeng (2003), describes what drives the cooperative dilemma in joint ventures and is based on game theory. The model developed in this paper substitutes Zeng's cooperative dilemma for one of the control problems in Dekker's framework. The model is tested in a case study; it appears that the extension with game theory helps explain the control mechanisms in the joint venture in more detail.

1. Introduction

Joint ventures (JVs) make for an interesting paradox: whereas the popularity of JVs is very high, the percentage of JVs that fail is very high too. In a world of rapidly increasing global competition most multinational enterprises (MNEs) will have to participate in (international) joint ventures in order to remain competitive and strategically flexible. However, many joint ventures do not deliver the hoped-for results and fail. The literature quotes a number of reasons why failure rates are high (e.g. Franko 1971; Gomes-Casseres 1987; Pearce 1997). One of these reasons is management control problems (Sherman 1992; Groot and Merchant 2000; Chalos and O'Connor 2004; Porporato 2006). The parent firms in a JV may well have differing interests. Insufficient control over a JV can limit the ability of the parent to coordinate its activities, efficiently utilise its resources and to effectively implement its strategy.

Interestingly, despite repeated remarks in the literature that management control is key to successful JV performance, it is an area that remains 'under-researched', (e.g. Groot and

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Merchant 2000; Kamminga 2003). Given this situation, I propose the following principal research question: What determines management control in JVs? First, a literature review (chapter 2) demonstrates that whereas joint ventures have been looked at from many different theoretical perspectives, a holistic framework for analysis is still largely missing. Most studies only consider a certain aspect, such as justification for formation of JVs or performance of JVs, and findings are often contradictory. Recently, various authors (Dekker 2004; Kamminga 2003; Kamminga and Van der Meer-Kooistra 2007) have presented analysis frameworks that combine transaction cost economics (TCE) theory with a number of elements borrowed from organisational (relational) theories. Another, much more limited group of authors have used game theory to investigate joint ventures (Parkhe 1993a; Zeng 2003). Game theory, with its well-known prisoner's dilemma, is especially suited to shed light on the continuous struggle of balancing cooperative and competitive behaviours of the partners in a joint venture. In chapter 3 I will argue that combining two existing frameworks, one based on TCE and organizational theory and the other based on game theory, leads to a more detailed model to explain management control in joint ventures. I test the theoretical framework, in chapter 4, on a case study to see whether it can explain the observed phenomena. It appears that the model can be used as a diagnostic tool to see whether the design of the management control system is adequate given the particularities of a joint venture. Finally, chapter 5 contains my conclusions as well as some recommendations for further research.

2. Prior literature

2.1 Introduction to joint venture research

In the literature on joint ventures a plethora of theoretical perspectives have been employed. Perhaps the most used theoretical perspective to explain formation and development of an IJV is transaction cost economics (TCE) (Williamson 1985). This theory focuses on governance structures for transactions. It maintains that a transaction can be governed by one of three structural mechanisms: a market form with price mechanism, a hierarchical form with bureaucratic governance mechanisms, or a hybrid form. The governance structure for a certain type of transaction will be the one with the lowest transaction costs (assuming equal production costs); transaction costs are, for example, costs of negotiation, of preparing and writing contracts, and of monitoring and enforcing those. The actual choice for a specific governance structure depends on certain characteristics of the transaction taking place (asset specificity, the frequency and size, and the uncertainty of the transaction) and certain characteristics of human nature (bounded rationality and opportunism). There are a large number of hybrid governance structures, which consist of a mixture of market and hierarchical characteristics; examples include long-term supply arrangements or joint ventures. According to this theory, joint ventures occur because the sum of production and transaction costs associated with joint ownership is lower than that of sole ownership (in the case of a wholly owned subsidiary) or of market transactions. The joint venture structure offers advantages in terms of avoidance of high uncertainty caused by market failure and avoidance of high overhead costs of establishing hierarchies (Child et al. 2005). TCE

theory emphasises the rational aspects of a transaction. It does not take into consideration any relational aspects: for example, how developing trust between partner firms may reduce opportunism and lead to more information sharing.

Apart from TCE theory, many other theories have been applied to the study of joint ventures. These theories can be broadly classified into economic theories and managerial or organizational theories, and aspects investigated can be divided into organization, operation and performance of JVs (Child et al. 2005; Robson et al. 2002). A comprehensive overview is provided in table 1. In a meta-analysis of JV literature Robson et al. (2002) focused on the aspect of JV performance. They concluded that findings from different studies on determinants of JV performance were often contradictory, and attributed this to the absence of an overall framework of analysis. Some authors have turned to developing such overall framework and in the following sections I will discuss one of them.

Table 1: Alternative theoretical perspectives to investigate IJVs – economic theories (adapted from Robson et al. 2002; Das and Teng 2000; Child et al. 2005)

Economic theories			
Theory	**Underlying logic**	**Focal aspects**	**Areas of concern**
Transaction cost economics (TCE)	The sum of production and transaction costs associated with joint ownership is lower than that for sole ownership of the venture or for market transaction	The size and division of exchange and production costs incurred, mitigation of the hazards of partner opportunism, the use of administrative procedures for control, and the alignment of financial incentives	No account is taken of the fact that IJVs are intrinsically strategic and can embody many different parental motives. Lack of attention to relational aspects of IJV partnership
Agency theory	IJVs act as agents through which parent organizations (the principals) aim to increase their business activities and success. The principals act to control costs they attribute to the agency relationship	Governance mechanisms that limit the agent's self-serving behaviour: principal and agent agendas may differ, leading to future conflict; this is exacerbated by cultural distance and avoided via parent-initiated control mechanisms	Agency hazards constitute just one difficulty amidst the many facing IJV managers. The assumption that IJV managers serve their own purposes before those of the parent firm may not be pragmatic

Resource-dependency theory	IJVs form to create bundles of strategic and social resources that serve as a source of competitive advantage and, in turn, superior performance	Achieving positional advantages on the basis of inter-firm resource complementarity, the scarcity of valuable firm resources, the coalitional nature of organizations, and the resource interface in IJVs	A comprehensive set of sources of advantage has not yet been isolated in the general management literature; little has been determined in the case of collaborative strategy. Difficulty in testing an IJV performance model for this dynamic perspective using cross-sectional data
Market power theory	Firms can improve competitive success by securing stronger positions in their markets through cooperative strategy	Distinction of cooperative strategies: offensive vs. defensive, scale vs. link; link between cooperative strategy and national and industrial context	Static perspective that does not take into account how the relationship may develop over time (e.g. development of trust, overruling rational choices)
Transaction value theory	Combination of transaction cost theory and resource-based theory: focus on joint value maximization for the collaborative transaction (not pure cost minimization or revenue maximization)	Aspects that TCE theory cannot explain because of its pure cost focus: e.g. situations where greater joint value is derived from less cost-efficient structures; increasing transaction specificity can raise transaction value and lower risk of alliance break-up (whereas TCE points to more safeguards needed to avoid break-up)	Largely the same as for TCE

Real options theory	Treatment of IJVs as real call options on the opportunity to invest in a foreign market: the buyer of the option holds the right to make a larger investment at a fixed price at a later date (when uncertainties are expected to be clarified)	Explanation for fact that many alliances do end up in acquisitions	Theory was developed for equity joint ventures; whether other cooperative strategies (contractual arrangements, non-equity partnerships) have option value remains unaddressed
Increasing returns theory	By acquiring a large market share early on, firms can lock in their customers and dominate the market without decreasing returns setting in (e.g. Microsoft)	Rationale for developing technological networks, research consortia etc.	Especially relevant for knowledge-based industries, much more so than for e.g. natural resource-based industries

Managerial/organizational theories			
Theory	**Underlying logic**	**Focal aspects**	**Areas of concern**
Behavioural perspective (relational contracting)	The development and successful evolution of IJVs depends largely on behavioural interactions and the presence of goodwill among the parties involved	Relational and interactional characteristics – such as trust, commitment, cooperation, and forbearance – and processes within the inter-firm partnership	Softer aspects should not always be placed before structural factors in developing IJV businesses, let alone be treated as an 'end' rather than a 'means'. Problems exist in the quantification of relational variables, the extant research is too general and diffuse

Game theory	Alliances can be viewed as games whereby the outcome depends on what each player involved chooses to do; pay-offs from cheating may be greater than those from cooperating, and thus, partners may not cooperate fully	Iteration of transactions can improve the prospects for cooperation by encouraging strategies of reciprocity. Recognition of duality between cooperation and competition. Distinction between situations in which cooperative strategy may be rewarding and in which it may be undermined	Simplifying assumptions are made that distance game theory somewhat from reality: e.g. personalities of the players, their social ties, communication between the players etc.
Bargaining power (political economy)	A sponsoring firm's level of control and performance in an IJV business is contingent on bargaining power it accrues from resources and capabilities	The interplay of power between the partners, their resources, goals, decision making control, and perceptions of equality, and the concept of productive exchange	Firms recognize that power play does not increase the size of the pie for each partner and enable the most to be made from the joint opportunity. Problems with the quantification of power/dependence
Organizational learning/ knowledge	IJVs represent a conduit through which firms can obtain tacit organizational knowledge embedded in others. Firms form partnerships to capitalize on opportunities to acquire particular new skills	How organizational knowledge possessed by the partners and IJV is used and managed; procedures for information transfer, transformation and harvesting	Learning is not a key factor for many firms engaged in IJVs; hence, learning outcomes may have little effect on IJV business performance. Quantitative study on the topic has not been able to elucidate how learning processes unfold over time. Perspective of 'learning race' stresses competitive aspects, but neglects cooperative aspects

Strategic management	IJVs are motivated by strategic behaviour in response to environmental conditions, and their performance hinges on whether a mutual co-alignment/fit between parent strategy and venture structure is achieved	Formative and structural aspects of the IJV are attributable to a focal parent's competitive position/strategy along with important traits of its industry	Lack of attention to the interactive relationship existing between partner firms. Firm homogeneity is unrealistically assumed

2.2 Management control in JVs

Merchant (1998) defined management control as "all the devices managers use to ensure that the behaviours and decisions of people in the organization are consistent with the organization's objectives and strategies". In the following sections I will first present a model that provides an overall framework of analysis of a joint venture and thereby links management control mechanisms to JV characteristics. Then I turn to an alternative way of looking at a joint venture, viz. as a balance between cooperation and competition; that again will provide insights into what management control mechanisms should be in place.

2.2.1 Dekker (2004): framework based on TCE and relational aspects

Dekker (2003, 2004) has developed a theoretical framework for the analysis of control structures in inter-organizational relationships, such as alliances or joint ventures, based on a combination of transaction cost economics and relational aspects. The framework is shown graphically in figure 1. Dekker's framework is structured around two control problems, 'appropriation concerns' and 'coordination requirements'. In 'appropriation concerns' one directly recognizes TCE theory, with its three determinants of governance structure, viz. asset specificity, uncertainty and frequency. Note that in joint ventures the frequency of transactions must be sufficiently high to justify the formation of a JV, and therefore this dimension can be omitted in the further discussion. Dekker states that a second purpose of control in inter-organizational relationships is the coordination of tasks between the partners: "Different logics of value creation, as determined by the strategic rationale of an alliance, result in different levels of interdependence, requiring different degrees of mutual adaptation and adjustment" (Borys and Jemison 1989). Coordination and joint decision-making will become more important the more interdependent and the more uncertain the tasks of the inter-organizational relationship. Other authors have also reported on the importance of interdependence and task uncertainty as determinants of governance structure (e.g. Kumar and Seth 1998; Casciaro 2003).

The control problems can be addressed by different types of control. Here, one recognizes the three types of controls developed by Ouchi (1979): the formal control mechanisms of outcome and behaviour control, and social or informal control. Dekker's framework suggests how control problems influence the need of partner firms not only to design and implement formal control mechanisms, but also to invest effort in selecting a good partner.

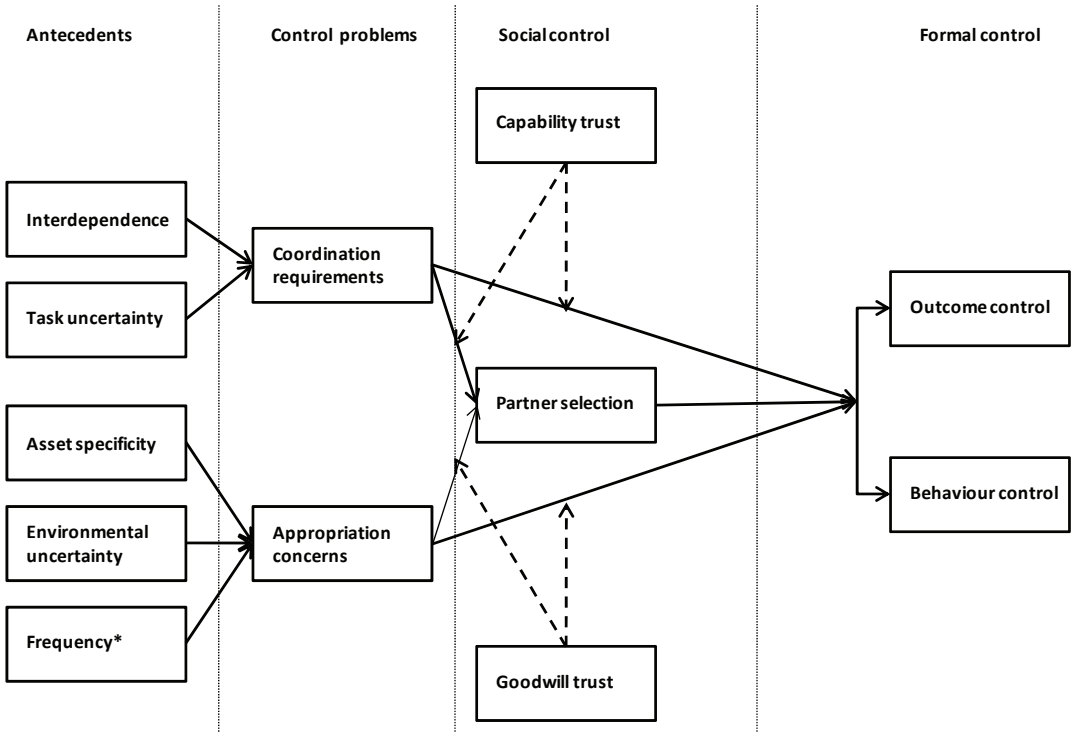

Figure 1: Framework for analysis of control problems in inter-organizational relationships such as alliances and joint ventures (Dekker 2004).

Selection of a good partner is a means to mitigate potential control problems *upfront*; design and implementation of formal controls is a means to manage the problems *once the problems appear*. Dekker argues that investing more efforts in finding a good partner reduces the need for formal control mechanisms.

An important aspect of this model is the role of trust, presented as an element of social control. Figure 1 shows two types of trust, capability and goodwill trust. This distinction was first proposed by Sako (1992), who in fact differentiated between three types of trust: contractual trust, capability trust and goodwill trust. Contractual trust, the lowest, most basic level of trust, relates to the expectation that the other party will fulfil its contractual duties. Contractual trust must be present in any joint venture relationship. Capability trust relates to the expectation that the other party will be competent and able to fulfil its promises satisfactorily. Goodwill trust, the highest level of trust, relates to the expectation that the other party will perform in the interest of the relationship (the JV), even if it is not directly in the interest of the other party – in other words, in case of goodwill trust the other party will abstain from behaving opportunistically. In Dekker's model, capability trust influences the control mechanisms that govern the problem of coordination of tasks; goodwill trust, on the other hand, influences the mechanisms that govern the problem of appropriation concerns (opportunism).

The relationship between formal controls and trust in JVs is the subject of a substantial body of literature (for example, Zaheer and Venkatraman 1995; Das and Teng 1998; Parkhe 1998; Tomkins 2001; Poppo and Zenger 2002; Poppo et al. 2007; Dekker 2004; Van der Meer-Kooistra and Vosselman 2006), representing a variety of views. Van der Meer-Kooistra and Vosselman (2006) summarize this literature neatly. They conclude that there are four different views. The first is that trust might be *a necessary condition* for control structures and practices to become socially constructed. A second position is that control structures and practices are themselves *sources* of trust. Management control technologies perform a function similar to the legal system: as with legal systems, management control mechanisms are put in place to reduce the risk of opportunistic behaviour. A third alternative is that (formal) control mechanisms can *help build* trust. The information exchange that is facilitated by the use of (formal) controls could create positive expectations about future contributions to the relationship and in this way build trust (Tomkins 2001; Poppo et al. 2007). Finally, the last view is that trust is an *alternative* to control structures and practices; in other words, trust can replace the design and implementation of control structures and practices. The building of trust might be an efficient solution for control problems where the costs of market-based or hierarchy-based controls are high, for example in transactions with high asset specificity and uncertainty (Vosselman and Van der Meer-Kooistra 2006; Dekker 2004; Das and Teng 2001). Dekker (2004) takes this last position that trust is an alternative to control structures and practices. He further argues that a higher level of trust has two consequences (see also figure 1): trust in a partner may have a *direct* effect on the need for formal control mechanisms (i.e. the higher the level of trust, the lower the need for formal controls), and it may have a *moderating* effect on the relationship between control problems and the use of formal control mechanisms.

Dekker confirmed his theoretical framework with case study research. I will come back to this in chapter 4 of this paper.

2.2.2 Zeng (2003): framework based on game theory and its 'cooperative dilemma'

An aspect that has thus far received little attention in the joint venture literature is the fundamental challenge for JV management to balance *cooperation* and *competition* among the partners. In a joint venture the partners should cooperate to achieve the JV objectives and hence achieve the desired value creation ('growing the pie'). On the other hand, partners will – almost naturally – compete to divide the anticipated benefits ('getting the largest slice of the pie'). Much of the literature has emphasized either the cooperative or the competitive side. Many authors have argued that JV management is about creating good relationships between partners and building trust (see for example the previous section (Dekker 2004), or Killing (1983)). On the other end of the spectrum are those who have focused on the competitive side, often in the context of organizational learning, whereby one partner attempts to absorb capabilities of the other partner(s) (Hamel 1991). Once that objective is fulfilled, it often means the end of the JV. Zeng (2003) argues that these two perspectives – cooperation and competition – should be combined, as each perspective on its own emphasizes only one side of what he calls the 'cooperative dilemma' of joint ventures. The cooperative perspective stresses the role of

cooperation and trust to ensure the desired value creation, but neglects, for example, the hidden cost of cooperative behaviour. The competitive perspective, on the other hand, overlooks the fact that a joint venture is a positive sum game, rather than a zero-sum game, as well as the fact that if all partners would behave in order to learn from the other partners this would have a detrimental impact on JV performance.

Game theory offers a theoretical ground to further investigate the tension between cooperation and competition in joint ventures. It provides a means to assess the likely consequences of competitive and cooperative behaviours in conditions where the benefits to one player depend on what the other players do. A central theme in game theory is the prisoner's dilemma: a situation where the optimal joint outcome can only be achieved through trusting cooperation. A joint venture can be regarded as an iterated prisoner's dilemma (Phelan et al. 2005; Parkhe 1993a, 1993b). JV partners will generally be concerned not to lose, and hence reluctant to reveal information; cooperation may therefore seem unlikely. However there is also an incentive to cooperate since the game is generally a non-zero-sum game (e.g. because of economies of scale), and it is known that the game will be played not once but over an extended period of time, so that a firm that does not cooperate (i.e. 'cheats') can be punished for its behaviour in the next round. Therefore, partner firms have an incentive to act opportunistically in the short term, but may learn to cooperate in repeated encounters. The immediate gain of the strategy of cheating is weighed against the sacrifice of future gains as a result of violating the agreement. The longer the time horizon of a joint venture, the closer it gets to a repeated game.

As indicated, only few authors have used game theory for analysis of JVs. I will present the framework of Zeng (2003) as it contains most detail. The starting point for his model is formed by the two most robust solutions for the prisoner's dilemma: changing the pay-off matrix and extending the shadow of the future. The pay-off matrix shows the potential rewards for cooperative and competitive behaviour. The higher the pay-off for cooperation relative to competition, the more likely it is that the partners will cooperate; in contrast, spill-overs will lead to a smaller difference in pay-off between cooperation and competition. The shadow of the future refers to the time frame for decision making in a game. As described earlier, if a prisoner's dilemma is played indefinitely, cooperation between the players will emerge. This is because the players have the possibility – in future interactions – to reward or punish each other for previous behaviour (in contrast to a single game). Thus, the longer this shadow of the future, the higher the pay-off will be from future cooperation and the more likely it is that partners will cooperate in the present. Zeng developed a number of hypotheses about factors that might promote cooperation among joint venture partners. These are listed in figure 2. Zeng confirmed his hypotheses by means of statistical analysis on a large sample of joint ventures.

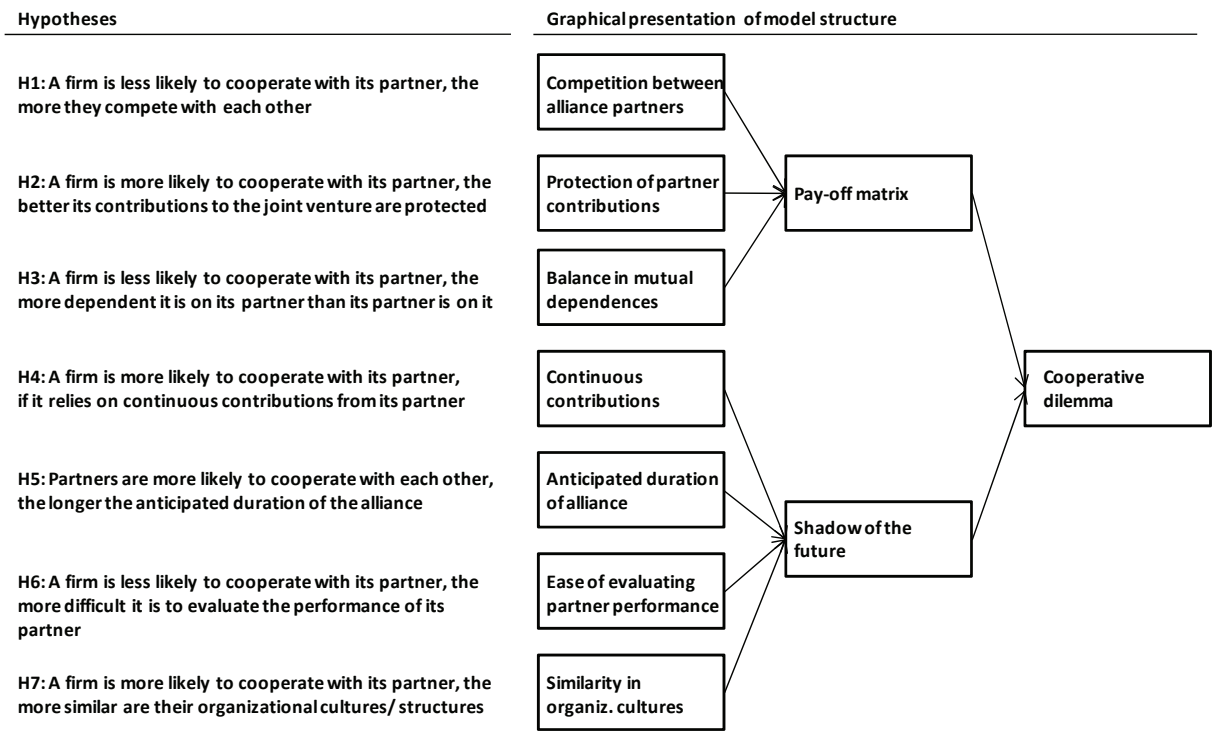

Figure 2: Hypotheses about the cooperative dilemma based on game theory (left) and a graphical representation of the model structure (right), based on Zeng (2003)

3. Hypothesis development

In this chapter I will argue that the framework developed by Dekker (2004) can be extended by using game theory. The hypotheses about factors influencing the cooperative dilemma, as developed by Zeng (2003), in fact present a different way of looking at the control problem of appropriation concerns from TCE theory.

Although in the previous chapter TCE theory was classified as an economic theory and game theory as an organizational/relational theory (table 1), the logic behind both theories has certain similarities. First, it should be noted that both theories are based on similar assumptions on human behaviour, i.e. bounded rationality and opportunistic behaviour. Second, in table 2 I demonstrate how the hypotheses from game theory, as developed by Zeng (2003), can be explained in terms of elements of TCE theory. It appears that all hypotheses either link back to asset specificity or to (various aspects of) uncertainty. Finally, two specific problems known from the prisoner's dilemma in game theory – the problems of hold-up and spill-overs – can also be explained in TCE terms. To maximize a partner firm's share of the JV benefits, a firm can use bargaining power. However, the use of bargaining power is constrained by the 'hold-up' problem: if the firm becomes (too) dependent on the other partners in the JV, it will lose its bargaining power and fall victim to potentially opportunistic behaviour by the other partners (Zeng 2003).

Table 2: Hypotheses from game theory explained in terms of transaction characteristics from transaction cost economics

Hypotheses from Zeng (2003)*	**Comments**
Changing the pay-off matrix	
H1: A firm is more likely to cooperate with its partner, if they compete less with each other	If the parent firms compete little, *uncertainty* from concerns about opportunistic behaviour is small
H2: A firm is more likely to cooperate with its partner, the better its contributions to the joint venture are protected	If contributions from parents are well-protected, *uncertainty* stemming from concerns about opportunistic behaviour of the other parents will be small or negligible
H3: A firm is more likely to cooperate with its partner, the less dependent it is on its partner than its partner is on it	If there is a good balance between contributions from the partners in a JV, *asset specificity* concerns become small (or rather: such concerns are balanced/equal for all partners)
Extending the 'shadow of the future'	
H4: A firm is more likely to cooperate with its partner, if it relies on continuous contributions from its partner	If continuous contributions from the parents are required, *asset specificity* concerns become small
5: Partners are more likely to cooperate with each other, the longer the anticipated duration of the alliance	If the intended duration of the alliance is long, this reduces *uncertainty* stemming from not knowing what the partner is up to
H6: A firm is more likely to cooperate with its partner, the easier it is to evaluate the performance of its partner	If it is easy to evaluate the performance of the partner(s), information asymmetries are small or negligible, which means in turn that *uncertainty* resulting from information asymmetries is small or negligible
H7: A firm is more likely to cooperate with its partner, the more similar are their organizational cultures/structures	If partners have similar organizational cultures and structures, *uncertainty* stemming from such differences will be small

* Some of the original hypotheses of Zeng have been modified so that now they are all formulated in the positive sense, i.e. starting with "A firm is *more* likely to..."

This can happen, for example, if one of the partners has invested in specific assets for the joint venture and cannot exit the JV without an important loss. In other words: the 'hold-up' problem relates to the problem of asset specificity in TCE theory. The other way to maximize a firm's benefits from the JV is by using the knowledge acquired through the JV in other activities: this is the so-called 'spill-over' problem. Spill-overs can be considered as one of the components of uncertainty in TCE theory (uncertainty about the – opportunistic – behaviour of the other partner firm(s)). Thus a partner in a JV has various

options to take actions that undermine cooperation, for example withholding information or refraining from JV investments. In general, it can be stated that a partner firm in a JV is less likely to cooperate with the other partner(s) the larger the asset specificity and the larger the uncertainty.

Summarizing, Zeng's cooperative dilemma provides a refinement of Dekker's control problem of appropriation concerns. The hypotheses as formulated by Zeng – when turned into statements – can be used to investigate the potential for a cooperative dilemma in a joint venture. This 'extended framework', combining Dekker and Zeng, is presented in figure 3. Dekker's control problem of appropriation concerns has been replaced by the cooperative dilemma. Rather than three variables (or even only two, since frequency is not a variable in the case of JVs), it now has seven variables. Especially when appropriation concerns are high for a given JV, this extension with game theory can provide more granularity when investigating potential control issues. The larger the dilemma, the more or more stringent control mechanisms are required to address the problem. In addition, the larger the dilemma, the higher the need for formal control mechanisms (as opposed to social controls), since social mechanisms will not be able to address the problem.

As far as trust is concerned, in the combined model, I shall assume that trust and formal controls are partly substitutes and partly complements. In case of high capability trust, fewer formal controls will be required to manage the problem of coordination of tasks (trust as substitute); but in case of high capability trust (but low goodwill trust), appropriation concerns still need to be covered by formal controls (trust as complement).

It should be noted that in the research of Dekker, the focus is purely on explaining patterns of management control in JVs, given the organizational and environmental context in which the JV operates. This also holds for other authors who have published research in this area, such as Groot and Merchant (2000) and Kamminga (2003). Dekker does mention however that "underlying the theoretical framework is the assumption that aligning the alliance's governance structure with its transaction and task characteristics will result in higher performance". In a later study of supplier-buyer relationships, Dekker tested this hypothesis (Anderson and Dekker 2005), and found, by means of statistical analysis, that the data indeed lent support to the hypothesis that alignment between the anticipated transaction hazards (i.e. control problems) and the management control structure corresponded with better performance compared to a situation of misalignment. Thus, the mentioned hypothesis that alignment between JV characteristics and management control mechanisms leads to better performance is plausible.

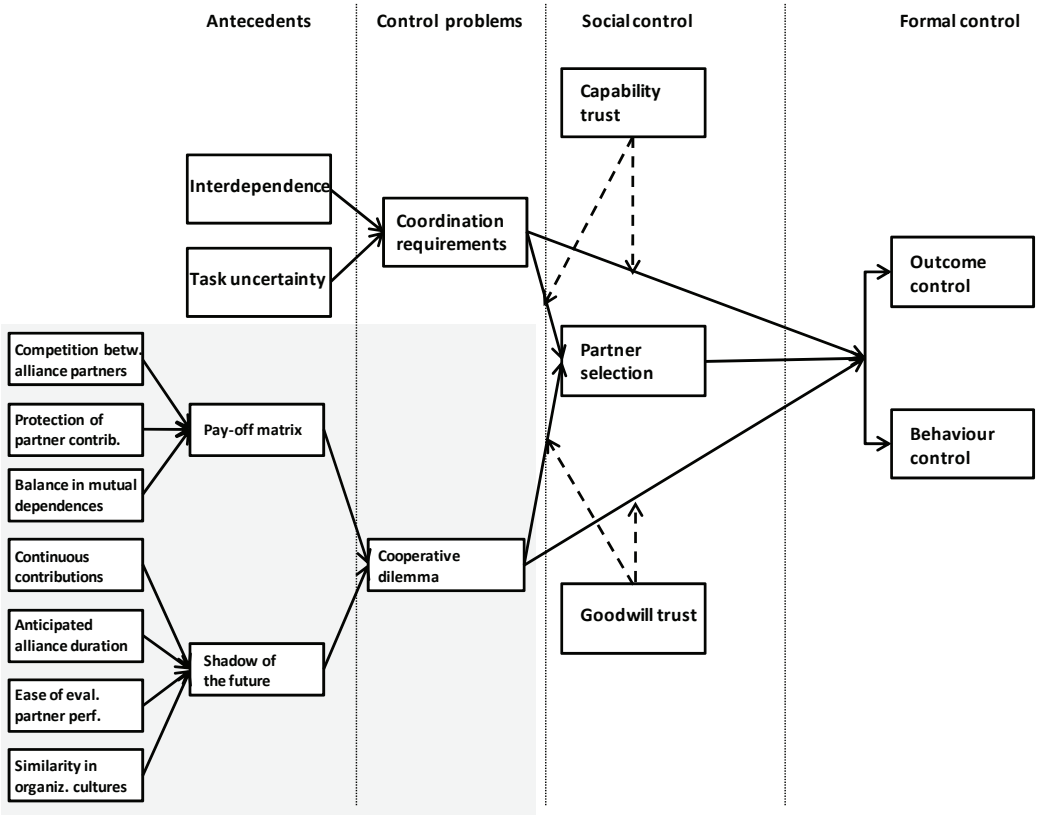

Figure 3: Framework developed in this paper, extending the framework from Dekker (2004) with hypothesis derived from game theory by Zeng (2003)

4. Case study

I will test the extended framework in a case study. The research design is that of an explanatory case study (Yin 1989), i.e. the theoretical model described in the previous chapter is used to understand and explain the reasons for management control practices in joint ventures. I will explore the same case study that Dekker used to illustrate his model and will thereby rely fully on the information provided by Dekker (2004)[40]. I first provide a brief introduction to this case study, based on Dekker's paper, followed by a description of findings from analysis with Dekker's framework. Finally I show how the model developed in this paper enhances the level of detail of Dekker's original analysis.

[40] In my Master's thesis I explore three different cases, of three international joint ventures – two manufacturing joint ventures and one in financial services. The findings from these three cases confirm the extended framework and show that adding the perspective of game theory is beneficial to understanding management control in JVs. However, because of confidentiality reasons, I cannot present these cases in this paper.
I therefore illustrate the extended model by exploring the example provided by Dekker (2004). Although Dekker's case study concerns a supplier-buyer alliance, he indicates that "the structure of the alliance has much in common with a joint venture. Joint financial investments are made, a separate organizational structure with a joint board and joint task groups is installed, specific tasks and resources are dedicated to it, and separate rules, regulations and costing and non-market pricing are used."

4.1 Background

Dekker's case concerns a strategic alliance between two companies, NMA and RIB. NMA is a Dutch company supplying components for railway safety. RIB is an organisation responsible for construction, installation and maintenance of the Dutch rail infrastructure, and was formed when the Dutch Railways were privatized in 1995. NMA is monopolist in The Netherlands. RIB is its largest domestic customer and accounts for a significant share of NMA's total turnover. When RIB was formed, the new management recognized that many of its supply chains were inefficient, and an important goal for RIB became better control of purchasing costs. As a test case, RIB initiated an alliance with NMA for half-barrier installations. NMA was chosen for several reasons. First, significant cost reductions were expected by reorganizing the supply chain. Second, because of the delivery risks for this type of product (monopolistic supply situation and serious consequences of inadequate delivery) a long-term supply relationship was deemed a good option. Third, the alliance seemed a good route towards more market orientation and cost consciousness within the RIB organization. And finally, RIB expected that NMA would be a good cultural fit given their long history of cooperation.

The contract that was set up covered the various aspects of the cooperation in detail. It included e.g. scope, goals, plans for achieving those goals, organizational structure, responsibilities of both parties, exchange of information, distribution and protection of intellectual property rights and a financial incentive system. Several appendices to the contract covered very specific items such as product descriptions and prices, a quality plan and a programme of improvement for coordination of innovation activities. These appendices were revised annually. The goal of the alliance was defined as the joint innovation of half-barrier installation systems to realize additional cost savings and to enhance its quality and safety. Some of the key elements of the management control structure were the following:

- Organizational structure: the alliance was set up as a separate organizational entity, with an alliance board (two members of each firm) and alliance staff. The board set out an alliance strategy and was responsible for turning strategy into action by agreeing short-term goals and an improvement programme (see below).
- Programme of improvement: for each innovation proposal, the programme of improvement prescribed a planning and progress scheme (specifying steps such as definition of functional requirements, attainability study, development etc.), a budget scheme, an estimation of the expected cost reduction, and a quality plan.
- Financial incentive system: an 'alliance fund' was set up to ensure mutual collaborative behaviour in the innovation process, in other words, to ensure that the partners' individual financial objectives were aligned with the alliance's objectives. This was done by setting up a scheme such that all planned innovations were financed from a central fund, financial results were accrued and the residual was divided following a pre-set schedule.
- Protection of proprietary knowledge: NMA's knowledge of the half-barrier installations was regarded a key factor for the success of the alliance. Therefore the contract specified that NMA would place its knowledge and experience at the disposal of the alliance. NMA was also assigned all intellectual property rights on the installations and

developments generated by the alliance. In return RIB received a non-transferable license for the use of the technology.

4.2 Analysis with Dekker's framework

Dekker showed that the control mechanisms in place can be explained on the basis of the two control problems, coordination of tasks and of appropriation concerns. Table 3 contains the various control elements present in the NMA-RIB case. Below I discuss them briefly.

Coordination of tasks was needed for the two alliance activities of supply of half-barrier systems to RIB and innovation. The supply task required controls such as standard ordering procedures and demand forecasts. The innovation task was more complex and characterized by higher uncertainty. Control instruments to address this problem included a separate hierarchical organizational structure with a joint alliance board and joint task groups, with decision rights and responsibilities; short-term goals for these task groups set by the board; task planning, budgeting and progress evaluation of the programme of improvement; and quality plans with annual auditing of their use. Management of appropriation concerns was done among others via the alliance fund. Although there was strong mutual dependency – RIB could not switch to alternative systems without incurring considerable cost and NMA could not switch to other buyers –, thus aligning the partners' interests, RIB was concerned NMA would have little incentive to work actively on innovation of the half-barrier systems and would simply use the alliance to secure turnover. NMA, in turn, was concerned it would not receive a fair share of the realized cost benefits. Therefore the alliance fund was set up such that it provided benefits to both parties. Furthermore the joint supervision of the alliance activities, with joint decision making and problem solving helped manage appropriation concerns. Finally, the clear specification in the contract of intellectual property rights and how to handle them, contributed to minimizing NMA's concerns about information spill-over to the alliance.

As far as trust is concerned, the NMA-RIB case is not fully conclusive. Dekker's framework is built on the assumption that trust can be a substitute for formal controls. However, the case shows that trust is certainly not fully exchangeable with control. Even though the level of trust was very high (supported by facts such as RIB obtaining full insight into the cost structure of the half-barrier installations), there were many formal controls in place (e.g. a very complete contract). In other words, a high level of trust does not necessarily lead to fewer formal controls. On the other hand, a high number of formal controls does not need to be detrimental to the level of trust. This lends support to the statement that trust is at least partially a complement to formal controls, rather than a substitute.

Table 3: Formal and informal control mechanisms in the NMA-RIB alliance (Dekker 2004)*

Outcome control	**Behaviour control**	**Social control**
Ex ante mechanisms Goal setting: - Strategic goals (CT) - Short-term goals (e.g. for cost reductions) (CT) Incentive systems: - Alliance fund (AC)	Structural specifications: - Ordering and supply procedures (CT) - Demand forecasts (CT) - Functional specifications (CT) - Programme of innovations (CT) - Quality plans (CT) - Specification and division of intellectual property rights (AC) Organizational structuring: - Alliance board (CT) - Task groups (CT)	Partner selection: - Long joint history and cultural 'fit' Interactive goal setting (AC): - Joint governance design - Short-term goals Reputation: - Trustworthiness for other alliances Trust: - Long-lasting relationship - Reputation RIB - Open book agreement - Intentional incomplete contracting
Ex post mechanisms Performance monitoring - Open book accounting (AC) Rewarding: - Benefit sharing	Behaviour monitoring: - Pre-action review of innovation ideas (AC) - Board monitoring (AC) - Auditing use of quality plans (CT)	Shared decision making & goal setting - Joint alliance board (CT) - Joint task groups (CT)

* CT indicates that the mechanism governs primarily the control problem of 'coordination of tasks',
and AC the control problem of appropriation concerns

4.3 Analysis with the extended framework developed in this paper

I now analyse Dekker's case based on the framework developed by Zeng (2003). Table 4 explains the seven parameters derived from game theory for the case of the NMA-RIB alliance. The table shows clearly that the control mechanisms in the NMA-RIB alliance were designed such those areas where potential control problems could arise, were covered adequately. Two potentially problematic areas were ensuring continuous contributions from both partners, and being capable to evaluate partner performance in the alliance. These were addressed with additional control measures. An alliance fund

was set up to ensure that both partners would contribute to (and benefit from) the primary objective of the alliance, i.e. cost reduction; a programme of innovation was set up with a specific, tight governance structure to ensure the other objective of the alliance was being worked by both partners. Furthermore, both parties gave insight into their work practices (e.g. product specifications) and cost figures (e.g. open book accounting), and several issues were worked together in the joint venture; this enabled both parties to evaluate each other's performance.

Extending Dekker's framework with game theory – the hypotheses developed by Zeng (2003) – thus helps in explaining in more detail the control mechanisms in place, and matching them to underlying control problems. In the case of the NMA-RIB alliance, Dekker found that the control mechanisms could be explained based on the control problems of coordination of tasks and appropriation concerns and their underlying antecedents. The extended model shows that replacing the problem of appropriation concerns by the cooperative dilemma and its determining factors can explain the control mechanisms in place better and in more detail. It also confirms that the control mechanisms match the control problems and therefore it is likely that this alliance functions successfully. This link between a match of control mechanisms with alliance characteristics and alliance performance could, however, not be substantiated in this case due to the lack of sufficient data.

Table 4: Hypotheses from game theory applied to the NMA-RIB alliance

Changing the pay-off matrix	
H1: A firm is more likely to cooperate with its partner, if they compete less with each other	NMA and RIB were not competing at all, they operated in different (product) markets → positive impact on cooperation
H2: A firm is more likely to cooperate with its partner, the better its contributions to the joint venture are protected	In setting up the JV (and the JV contract), specific attention was paid to aspects of intellectual property so that NMA did not need to be concerned about information spill-over → positive impact on cooperation
H3: A firm is more likely to cooperate with its partner, the less dependent it is on its partner than its partner is on it	There was a mutual dependency between NMA and RIB: NMA was the only supplier to RIB, whereas RIB was the most important customer of NMA. In other words, NMA did not depend more on RIB than RIB depended on NMA → positive impact on cooperation
Extending the 'shadow of the future'	
H4: A firm is more likely to cooperate with its partner, if it relies on continuous contributions from its partner	RIB was concerned NMA would use the alliance to simply secure turnover, and NMA was concerned to earn a fair share of the cost savings and to realize sufficient turnover. Therefore, specific measures were taken, i.e. the programme of innovation and the alliance fund → positive impact on cooperation
5: Partners are more likely to cooperate with each other, the longer the anticipated duration of the alliance	When setting up the alliance, the partners had a long time horizon in mind → positive impact on cooperation
H6: A firm is more likely to cooperate with its partner, the easier it is to evaluate the performance of its partner	Specific measures taken by the alliance included intensive exchange of data as well as personnel, and 'open book accounting', enabling each partner to evaluate the performance of the alliance and of the other partner → positive impact on cooperation
H7: A firm is more likely to cooperate with its partner, the more similar are their organizational cultures/structures	One of the reasons of RIB for selecting NMA was the long history of cooperation and a good cultural fit between the organizations → positive impact on cooperation

5. Conclusions

From a confrontation of an actual case with the theoretical framework, it has become clear that the extended model has proven adequate in explaining the observed control patterns as well as the observed control problems. Whereas the two original control

problems, coordination of tasks and appropriation concerns, appear sufficient to explain the observed (formal and social) control mechanisms, replacing the problem of appropriation concerns by the cooperative dilemma from game theory adds further to the analysis – it provides an additional layer of granularity. The hypotheses derived from game theory are useful to further investigate the situation in terms of potential opportunism, and at the same time they provide indications of how potential concerns can be addressed: how to change the pay-off matrix and how to extend the shadow of the future in favour of more cooperation at the expense of competition. As such, the extended model can serve as a diagnostic tool to assess the joint venture management control mechanisms in place and provides more detail and clearer indications of how to close control gaps than the original model by Dekker.

The work presented in this paper also has some shortcomings. Dekker (2004) already mentioned that the role of trust and especially the relationship between trust and formal controls needs further attention; the extended model presented in this paper does not add any further insights on this point. Further work could take the form of a longitudinal study, to look at the development of trust and how it impacts other control mechanisms. Furthermore, the link from a good match between management control pattern and joint venture characteristics to joint venture performance remains to be substantiated further. Again, further work could consist of a longitudinal study or a statistical analysis of a sample of different joint ventures.

References

Anderson, S.W., H.C. Dekker. 2005. Management control for market transactions: The relation between transaction characteristics, incomplete contract design, and subsequent performance. *Management Science* 51(12): 1734-1752.

Axelrod, R. 1984. *The evolution of cooperation*. New York: Basic Books.

Borys, B., D.B. Jemison. 1989. Hybrid arrangements as strategic alliances: theoretical issues in organisational combinations. *Academy of Management Review* 14(2): 234-249.

Casciaro, T. 2003. Determinants of governance structure in alliances: the role of strategic, task and partner uncertainties. *Industrial and Corporate Change* 12(6): 1223-1251.

Chalos, P., N.G. O'Connor. 2004. Determinants of the use of various control mechanisms in US-Chinese joint ventures. *Accounting, Organizations and Society* 29(7): 591-608.

Child, J., D. Faulkner, S. Tallman. 2005. *Cooperative strategy – managing alliances networks, and joint ventures*. Oxford, U.K.: Oxford University Press.

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

Das, T.K., B. Teng. 2000. Instabilities of strategic alliances: an internal tensions perspective. *Organization Science* 11(1): 77-101.

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

Dekker, H.C. 2003. Control of inter-organizational relationships: the effects of appropriation concerns, coordination requirements and social embeddedness. Ph.D. dissertation, Free University Amsterdam, The Netherlands.

Dekker, H.C. 2004. Control of inter-organizational relationships: evidence on appropriation concerns and coordination requirements. *Accounting, Organizations and Society* 29(1): 27-49.

Franko, L.G. 1971. *Joint venture survival in multinational corporations*. New York: Praeger Publishers.

Gomes-Casseres, B. 1987. Joint venture instability: is it a problem? *Columbia Journal of World Business* 22(2): 97-102.

Groot, T., K. Merchant. 2000. Control of international joint ventures. *Accounting, Organizations and Society* 25(6): 579-607.

Hamel, G. 1991. Competition for competence and inter-partner learning within international strategic alliances. *Strategic Management Journal* 12 (Special issue: Global Strategy; Summer): 83-103.

Kamminga, P.E. 2003. Management control of joint ventures. Ph.D. dissertation, Rijksuniversiteit Groningen, The Netherlands.

Kamminga, P.E., J. van der Meer-Kooistra. 2007. Management control patterns in joint venture relationships: a model and an exploratory study. *Accounting, Organizations and Society* 32(1-2): 131-154.

Killing, J.P. 1983. *Strategies for joint venture success*. Beckenham/Kent, U.K.: Croom Helm.

Kumar, S., A. Seth. 1998. The design of coordination and control mechanisms for managing joint venture-parent relationships. *Strategic Management Journal* 19(6): 579-599.

Merchant, K.A. 1998. *Modern management control systems: text and cases*. London, U.K.: Prentice-Hall International.

Ouchi, W.G. 1979. A conceptual framework for the design of organizational control mechanisms. *Management Science* 25(9): 833-848.

Parkhe, A. 1993a. Partner nationality and the structure-performance relationship in strategic alliances. *Organization Science* 4(2): 301-324.

Parkhe, A. 1993b. Strategic alliance structuring: a game theoretic and transaction cost examination of interfirm cooperation. *Academy of Management Journal* 36(4): 794-827.

Parkhe, A. 1998. Understanding trust in international alliances. *Journal of World Business* 33(3): 219-240.

Pearce, R.J. 1997. Toward understanding joint venture performance and survival: a bargaining and influence approach to transaction cost theory. *The Academy of Management Review* 22(1): 203-225.

Phelan, S.E., R.J. Arend, D.A. Seale. 2005. Using an iterated prisoner's dilemma with exit option to study alliance behaviour: results of a tournament and simulation. *Computational and Mathematical Organization Theory* 11(4): 339-356.

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

Poppo, L., K.Z. Zhou, S. Ryu. 2007. Alternative origins to interorganizational trust: an interdependence perspective on the shadow of the past and the shadow of the future. SSRN working paper.

Porporato, M. 2006. Impact of Management Control Systems' intensity of use on joint venture's performance: an empirical assessment. SSRN working paper (presented at AAA 2007 Management Accounting Section Meeting).

Robson, M.J., L.C. Leonidou, C.S. Katsikeas. 2002. Factors influencing international joint venture performance: theoretical perspectives, assessment and future directions. *Management International Review* 42(4): 385-418.

Sako, M. 1992. *Prices, quality and trust: Inter-firm relationships in Britain and Japan*. Cambridge, U.K.: Cambridge University Press.

Sherman, S. 1992. Are strategic alliances working? *Fortune* 126(6): 77-78.
Tomkins, C. 2001. Interdependencies, trust and information in relationships, alliances and networks. *Accounting, Organizations and Society* 26(2): 161-191.

Van der Meer-Kooistra, J., E. Vosselman. 2006. Research on management control of interfirm transactional relationships: whence and whither. *Management Accounting Research* 17(3): 227-237.

Vosselman, E., J. van der Meer-Kooistra. 2006. Efficiency seeking behaviour in changing management control in interfirm transactional relationships – An extended transaction cost economics perspective. *Journal of Accounting and Organizational Change* 2(2): 123-143.

Williamson, O.E. 1985. *The economic institutions of capitalism: firms, markets, relational contracts*. New York: The Free Press.

Yin, R.K. 1989. *Case study research – Design and methods, revised edition*. Newbury Park, CA: SAGE Publications.

Zaheer, A., N. Venkatraman. 1995. Relational governance as an interorganizational strategy: an empirical test of the role of trust in economic exchange. *Strategic Management Journal* 16(5): 373-392.

Zeng, M. 2003. Managing the cooperative dilemma of joint ventures: the role of structural factors. *Journal of International Management* 9(2): 95-113.