Effective contracting for high operational performance in projects

Abstract

Purpose – This study examines combinations of contract clauses in order to ascertain which combinations correlate to high operational performance.

Design/methodology/approach – Two hypotheses were formulated from contracting theory and tested on data collected from 45 projects. Fuzzy-set qualitative comparative analysis was used and validated with multiple regression and simulation.

Findings – The hypotheses were tested to determine whether combinations of classical, relational and/or associational contract clauses correlate to high operational performance. The results show that, whereas high operational performance correlates to combinations of relational and associational contract clauses, classical and relational clauses should not be combined.

Originality/value – This study contributes to the theory of contractual incompleteness and complementarity, specifically in the context of project contracting. The analysis produced two theoretical implications: first, that better performing contracts are created when combining relational and associational contract clauses, and; second, that, in projects, relational and classical contract clauses are not complementary with regards to realising high operational performance.

Practical implications – The managerial implications of the findings include a more thorough understanding of the use of contract clauses and of which clauses managers should combine to achieve high operational performance.

Research limitations/implications – Directions are proposed to guide future research in order to produce a more nuanced testing of contractual complementarity.

Keywords – *Classical and relational contracts, contract clauses, operational performance, projects*

1. Introduction

The motivation underpinning the theory of incomplete contracts (Hart 1995; Hart and Moore 1990; Grossman and Hart, 1986) is to understand the limitations of the contracts that fail because of bounded rationality in predicting opportunism in future contingencies, moral hazards, contract writing, enforcing, and monitoring costs. The relevant literature mainly focuses upon two widely adopted types of contracts - namely, classical and relational. While classical contracts establish the rules for discrete and simple, one-off transactions or exchanges, and are often used as tools for dealing with transactions at arm's length; relational contracts approach the matter not merely as one-off transactions, but also as relationships so they use clauses with extra-contractual relationship means (Kimel, 2007: 235-6). The extant literature and practice alike argue that both classical and relational contracts are incomplete (Howard et al., 2018; Grandori, 2010; Williamson, 1999).

To resolve the issue of incompleteness, some studies have explored whether the two types of contracts could be combined (e.g. Sumo et al., 2016; Wacker et al., 2016; Hartmann et al., 2014; Kalkancı et al., 2014; Smith and King, 2009). However, these studies have not explored the combinations of contract clauses. Rather, some studies tried to explore how classical contracts can be combined with extra-contractual relational mechanisms such as trust, authority, or norms (Maylor and Turner, 2017; Caldwell and Howard, 2014; Lumineau and Malhotra, 2011; Weber and Mayer, 2011; Poppo and Zenger, 2002), but they have not specified how relational and classical contract clauses can be combined. In response, other studies have put forward new types of contracts called "associational", designed to help contracting parties to react to uncertainties (e.g. Grandori and Furlotti, 2006). To our knowledge, the issue of contract clauses combination remains unanswered because no study has hitherto tested combinations of contract clauses (as emphasized by, for instance, Howard et al., 2018; Hartmann et al., 2014; March et al., 2000). In other words, research needs to test the combinations of contracts, which amounts to testing the combinations of clauses.

Contracts providing legal governance for projects are often formulated in environments involving highly complex relationships; environments in which time and

cost pressures do not allow relational mechanisms to evolve (Broekhuis and Scholten, 2018; Curlee and Gordon, 2011; Oltra et al., 2005). Thus, contract incompleteness and complementarity need to be investigated in project contracts in other ways (Howard et al., 2018; Sumo et al., 2016; Kalkancı et al., 2014; Roehrich and Lewis, 2014).

Accordingly, the following research question was posed: *What combination (or combinations) of contract clauses can lead to high operational performance in projects?* Our approach involved the derivation of hypotheses focusing on combinations of contract clauses and then, the testing of each of these in relation to whether they could bring about high operational performance (OP). This type of analysis constitutes more than a technical study and more than just an example of the application of current theory. The theoretical and practical contributions of this work are important for those who theorize and handle inter-organizational relationships in complex and uncertain supply chains (MacCormack and Mishra, 2015), and in high-risk, high-variety operations such as projects (Davies and Brady, 2000).

The hypotheses were tested on a sample of 45 case studies using fuzzy-set Qualitative Comparative Analysis (fsQCA) validated through multiple regression and simulation. This study offers the following theoretical contributions. First, findings show that high OP in projects is achieved by combinations of relational and associational contract clauses. Second, that classical and relational clauses should not be combined. The results contribute to the theory of contractual incompleteness and complementarity, specifically in projects.

The remainder of the manuscript is structured as follows. First, the review section provides an overview of the main issues in contractual incompleteness and complementarity and of the types of contract clauses linked to performance, the constructs and the hypotheses. The method section provides justification for the suitability of configuration analysis to the context and subject of the study, and a detailed protocol of the data collection and analysis involved. Finally, our findings are presented and the theoretical and managerial implications as further research opportunities are discussed.

2. Theoretical Background and Hypotheses

In the first part of this section, the issues pertaining to incompleteness and complementarity in contracting are explained. In the second part, the literature on contract clauses is reviewed, the constructs are developed, and the hypotheses are derived.

2.1 Contractual incompleteness and complementarity

Since the late 1980s, there has been a considerable increase in studies addressing incompleteness in contract theory (Hart and Moore, 1990; Grossman and Hart, 1986;). The literature started exploring incompleteness from the following ideas, drawn from transaction cost economics (TCE) (Williamson, 1985), that insufficient contractual safeguards can result in inefficient levels of investment; that trading partners fear opportunistic behaviors; and that the avoidance of inefficiencies and opportunism provide the boundaries of action. Contracts may exhibit two forms of incompleteness: *discretion*, meaning that they do not specify the parties' behaviors in sufficient detail; and *rigidity*, meaning that the parties' obligations are not sufficiently correlated to the external states or contingencies (Battigalli and Maggi, 2002). In the theory of incomplete contracts, the main concern is to investigate the limitations of those contracts that fail to specify contingencies and to set up safeguards guiding action involved in the transaction (Lewis and Roehrich, 2009; Hart 1995). The reason for such failures can be due to bounded rationality and incomplete information making it impossible to anticipate contingencies, therefore leading to difficulties in clarifying the appropriate actions to be taken by each contracting party. This often results in the wrong course of action being prescribed in the clauses and rising complexities in contract structures, with unnecessary clauses and increased writing, monitoring, and enforcing costs (MacLeod, 2000).

In contrast to TCE, which seek to match contract structures to the characteristics of transactions, relational contract theory (RCT) espouses extra-contractual relational mechanisms (such as trust, authority, or norms) as being more efficient in constraining opportunism, while offering more flexibility and lowering set-up costs

(MacNeil and Campbell, 2001; MacNeil, 1999). The logic behind relational contracting is that the existence of non-legal or social sanctions forces partners to fulfill their commitments (Lewis and Roehrich, 2009). In this way contractual incompleteness, transaction hazards, and opportunistic behavior can be controlled, which implies that relational contracting has complementary effects to classical contracts (Lumineau and Malhotra, 2011; Weber and Mayer, 2011; Susarla et al. 2009; Poppo and Zenger, 2002). However, RCT assumes the existence of a prior relationship between partners. This may be the case in inter-organizational supply chain environments in which partners have the time and make conscious investments to develop such relationships (Gil, 2009; Skaates et al., 2002). The extant literature considers this a 'weak' point of relational contracting, as the suitability of this assumption may not be verifiable in contexts in which temporary organizations have strict time and resource constraints and function on swift trust (Curlee and Gordon, 2011; Oltra et al., 2005; Davies and Brady, 2000). In terms of incompleteness, relational contracts can be less legally binding, because they contain more and weaker clauses that are neither enforceable nor observable by third parties (Furlotti, 2007; Klein-Woolthuis et al., 2005). This lack of specificity in relational clauses may also cause ambiguity and leave space for opportunistic behaviors (Luo, 2002). Thus, the safeguarding function of a relational contract may be less effective.

In summary, both the classical and relational forms of contracting are found to be incomplete and more likely to be ineffective and highly complex, thus constraining operational flexibility whilst also leading to disputes and to trust deterioration (Faems et al., 2008). Due to the incompleteness of both classical and relational contracting and to the polarities that exist between them, they have been seen as potentially having complementary effects. Many studies have called for the discovery of ways to combine them to achieve better performance (e.g. Howard et al., 2018; Sumo et al., 2016; Kalkancı et al., 2014; Roehrich and Lewis, 2014).

The technical definition of complementarity (Ennen and Richter, 2010: 208-9; Milgrom and Roberts, 1995: 181), states that "*doing more of one element encourages the increase of another*"; conversely, Poppo and Zenger (2002: 713) proposed that "*the combination of the two should generate higher performance than either [governance*

mechanism] in isolation". Based on this definition, studies investigated if classical contracts could make transactions efficient when combined with extra-contractual relational mechanisms such as trust (Mayer and Teece, 2008; Williamson, 1985). However, these studies did not test classical contract clauses with relational or other types of contract clauses. Therefore, although extant theory suggests that the combination of classical and relational contracts can reduce incompleteness, the grounds for testing this argument through an empirical model have not been laid.

2.2 Combining contract types

There are three contract types in the literature: classical, relational, and associational (Appendix 1). The differences between them are found in the focus of their regulation, which is, respectively, either the transaction process (classical and relational), or the decision-making process (associational). The contract structures are also different (Appendix 1): classical contracts are segmented according to the parts of the transaction process; relational contracts according to the relationships' life cycles. associational contracts are based upon the "core" of the decision and resource rights and the "belt" sections of a mix of contingency clauses (Grandori, 2010: 153, 359; Grandori and Furlotti, 2009: 85-86; Kimel, 2007: 236).

Although several issues have been raised in the literature regarding the combination of contracts, the main ones are diversity and uncertainty within the transaction. The extant theory holds that the complementary use of contracts may differ due to these transactional characteristics (Mallewigt et al., 2012; Poppo and Zenger, 2002; Uzzi, 1997). Contingency factors influence transactions and often lead to more customized versions of a contract type (Ng and Nudurupati, 2010). This customization is based on the premise that the terms of an agreement can be presented in varied ways (Poppo and Zenger, 2002) - from informal promises to formalized detailed clauses - to fit practice (Schepker et al., 2014). This issue is relevant to this study because projects are distinctively characterized by high levels of risk, difficulty in establishing relational mechanisms, and high levels of change and contingency (Gil, 2009; Skaates et al., 2002). When uncertainty is high and relationship lifecycles are short, contracts can become complex and detailed. Therefore, project

contracts often inhibit the flexibility that is required by projects more than by other operational forms. Any extra-contractual mechanisms are weak because of the short project relationship lifecycles, so combining contract clauses is the only way to test complementarity (Mellewigt, et al., 2012). In the next section, we review the clauses and discuss their combination.

2.3 Combining contract clauses

Contract clauses are specific provisions that clearly define the duties, rights, and privileges possessed by each partner under the contract terms. Each clause also addresses a specific aspect (such as quality, delivery time, and/or specifications) related to the transaction and may address a procedure and its standards. In order to develop a hypothetical model suited to test the idea of combining classical and relational contract clauses, the clauses used in the aforementioned three contract types need to be reviewed (section 2.4) to derive hypotheses stating how such clauses could complement each other to drive high OP. This was done by reviewing those studies that had identified and categorized the clauses (see Table 1) found in classical, relational, and associational contracts.

<Please insert Table 1 here>

Contract clauses can be assessed by reading the contract document that formalizes the regulations, processes, and policies that guide the relationship. Different clauses serve different purposes and hence can be classified in different ways. Some studies have investigated the contract clauses that are prevalent in a specific industry (Lui and Ngo 2004). They focused on price, cost, or performance (Essig et al., 2016; Caldwell and Howard, 2014). Other studies have created sets of contract clauses according to their specific functions and to the perspective from which they originate. For instance, Mellewigt et al. (2012) classified clauses found in alliance contracts, calling them safeguarding, coordination, and contingency-adaptability. Luo (2002) classified a task-specificity set, clarifying the partners' roles and responsibilities, and a contingency-adaptability set, specifying action plans for the handling of unanticipated contingencies. Some studies have split individual sets

7

into various sub-sets for more nuanced contractual functions (e g. Reuer and Ariño, 2007). Others have compared sub-sets of contract clauses and measured them in isolation to one another (e.g. the 24 clauses pertaining to four contractual functions measured independently in Anderson and Dekker, 2005; the three sub-sets-namely, contract detail, monitoring, and penalties in Ryall and Sampson, 2009; and the task description and contingency planning clauses in Argyres et al., 2007). Grouping contract clauses into sets is an accepted way of categorizing them, which also helps in operationalizing their large numbers.

The extant contracting literature offers very limited insights into the relationship between contract clauses and performance (Stevenson and Spring, 2007). This connects to the question of whether different clauses instigate different trade-offs in performance (MacCormack and Mishra, 2015). For instance, certain clauses may prioritize cost over time or scope. These trade-offs are at the center of the discourse about 'performance in contract designs' (Kalkancı et al., 2014) and reveal the major dilemmas inherent to how contracts support high OP (MacCormack and Mishra, 2015). There is also the view that partners negotiate and align performance expectations within the process of contracting (Selviaridis and Spring, 2018) and the contract then represents the negotiated mutual expectations. According to Cannon et al. (2000), the relational part of the agreement reflects the expectations both partners have of each other, which develop as they work together to define mutual goals. This has particular importance for the clauses that establish performance, because they are co-constructed with key stakeholders based on these expectations (Batista et al., 2017). Still, their benefits realization in project contracts remains a major under-explored area (Zwikael and Meredith, 2018).

Based on the review of the studies, we summarize in Table 1 the three distinct sets of contract clauses, which are discussed in more detail in the next section in order to develop the constructs for testing the hypotheses.

8

2.4 Hypotheses development

In the following sections we define the independent variables which are three key sets of contract clauses (see Table 1) before positioning the study's hypotheses.

2.4.1 Classical contract clauses

The literature on classical contract clauses is the largest of the three. Moreover, a large number of clauses exists as an outcome of the risk-averse approach of classical contracting, which produces very detailed, situation specific clauses; this increases their number, as several probabilities need to be covered in any situation (Williamson, 1999). Several articles have grouped clauses into sets according to their roles in the transactions. There are four groups of classical clauses (Table 1): (i) action-based clauses-accountability, monitoring, evaluation, and performance standards (time, cost and scope); (ii) property rights (asset specificity/IP; financial obligations, confidentiality and exclusivity); (iii) transaction controls-payments, prices, rewards, penalties, and liabilities; and (iv) end of transaction-dispute resolution and termination procedures.

More specifically, the clauses deal with property rights (e.g. Hagedoorn and Hesen, 2007), confidentiality (Reuer and Ariño, 2007), service scope and performance guarantees (Susarla et al., 2009), task details, roles, responsibilities and monitoring (e.g., reporting), assessment and evaluation (Argyres and Mayer, 2007); unilateral early termination (Mayer, 2004), risk allocation, enforcement, and supervision costs, penalties for underperformance (Ryall and Sampson, 2009), as well as dispute resolution (Hagedoorn and Hesen, 2007; Reuer and Ariño, 2007).

Prior studies have argued that classical contracts are incomplete (Grossman and Hart, 1986). In other words, contract clauses cannot safeguard against opportunism and become unnecessarily complex in their effort to do so (Henisz et al. 2012; Williamson, 1999). They cannot provide complete information and often feature expectation misalignment, as well as a focus on differences, rather than on mutual benefits (Zwikael and Meredith, 2018). Moreover, they emphasize penalties as a preventative mechanism (Sommer and Loch, 2009) and involve high costs to be

9

reworked and rewritten (Howard et al., 2018; Roehrich and Lewis, 2014). Because of the complexity reached by their sheer number, classical clauses are not conducive to flexibility when problem solving is required in situations of contingency, change, and emergence (Vaaland and Håkansson, 2003) and therefore often lead to low performance.

2.4 2 Relational contract clauses

Relational contract clauses are less specific and more general principles and codes of conduct that are intended to inspire and guide behaviors (good faith, due diligence, non-competition, see Table 1). These clauses act as a kind of relationship blueprint (Ryall and Sampson 2009) that facilitates the establishment of norms (Kern and Willcocks, 2000). Relational clauses replace their classical counterparts' risk allocation approach with a risk sharing one (Furlotti, 2007), focus on incentives, and play a vital role in mitigating concerns and clarifying the partners' mutual expectations (Puranam and Vanneste, 2009). For instance, a clear delineation of the partners' roles, tasks, and responsibilities helps to reduce complexity and to avoid costly misunderstandings (Ryall and Sampson, 2009; Argyres et al., 2007). These clauses can further specify information procedures, describe the responsibilities of and interactions between partners (Susarla et al. 2009), define processes for sharing information, layout external constraints and obligations-such as those pertaining to information disclosure and interaction with third parties (Reuer and Ariño, 2007), and regulate the roles played by boundary-spanners, gatekeepers, or other kinds of mediators between partners (Mellewigt et al., 2012). Other relational clauses (see Table 1) include hiring practices carried out through non-competing and non-solicitation agreements (Reuer and Ariño, 2007), or the designation of specific persons as dedicated alliance managers (Ryall and Sampson, 2009). Finally, they also include rules for conflict resolution (negotiation, type of mediation, and arbitration).

Prior studies have argued that relational contract clauses are often vague and low in specificity (Sumo et al., 2016). Examples are revision clauses, the doctrine of excuse or dispute resolution and arbitration procedures (Scott, 2013). Relational

clauses do not make many provisions for enforcement or penalties as they depend on non-legally enforceable extra-contractual mechanisms (such as informal adjustments, trust, authority or norms) for the clauses to be enforced (Maylor and Turner, 2017; Furlotti, 2007; Williamson, 1999). Similarly to classical contracts, relational contracts may in practice become highly complex (Remington, 2011), thus leading to issues of contract complexity while still enabling partners to act opportunistically (Brandon-Jones and Carey, 2011).

In summary, classical and relational contract clauses have a different focus concerning how transactions should be regulated. Taking into consideration the argument pertaining to their complementarity discussed in sections 2.1-2.3, the following hypothesis is positioned:

H_1: *Combinations of classical and relational contract clauses are positively correlated to high operational performance*.

2.4.3 Associational contract clauses

Extant studies have addressed an additional set of contract clauses that may help to deal with the incompleteness inherent in classical and relational contracts. Following Grandori and Furlotti (2006: 7, 11), these contract clauses, which are labeled '*associational*', are useful for the design of less complex and more flexible contracts. They are high-order, content-free, framing clauses that create a core that functions as a constitution (general statement). The core governs the process of adjusting the terms of transactions over time (Grandori, 2010: 359; Grandori and Furlotti, 2009: 86). An associational contract uses this 'core of associational clauses' and then adds a 'belt' of supplementary ones. While the core functions as a constitution - a general direction for the allocation of decision-making rights and for the commitment (lock-in) of resources - the belt contains clauses, which may be either classical or relational or both, that are suitable to the situation and to the business relationship (Grandori and Furlotti, 2009: 96).

Grandori (2010: 357) suggested what should be the "core" of resource lock-in clauses: (i) a specification of which resources should be pooled; (ii) a specification of which actors should provide them; (iii) a specification of which rights over resources are pooled and which are not - in particular: who owns the committed assets, according to what procedures actions and projects are to be selected, and how the rights to residual rewards are to be distributed; and (iv) by which mechanisms resources should be locked-in while providing exit rights and modes (as distinct from the resources committed). Examples of 'core' constitutional provisions are: how decision rights are to be allocated; which procedures are to be followed in decision-making joint-steering committees and their limits and liabilities; and what boundaries are set to limit autonomous actions (Grandori and Furlotti, 2009, 2006) (see Table 1). Associational clauses support democratic, multi-party decision-making systems (such as work cooperatives). They focus on defining the boundaries of the association between the partners in times of contingency, without creating extra safeguarding or relational rules. Mellewigt et al. (2012) wrote that these clauses are of "the contingency-adaptability type", which deals with force majeure (Hagedoorn and Hesen, 2007; Luo, 2002), price adjustment, or change procedures (Mayer and Bercovitz, 2008).

Until now, these clauses have been the subject of few studies; however, they are attracting increasing attention because modern partnerships are becoming more unstable and contingent on dynamically changing environments. Mellewigt et al. (2012) noted that associational clauses have an effect on relational ones when combined. Similarly, Luo (2002) stated that associational clauses might even combine with others as an outcome of learning (Argyres et al., 2007). These arguments lead to the second hypothesis:

H2: *Combinations of associational and relational contract clauses are positively correlated to high operational performance.*

3. Method

3.1 Multiple methods for cross-validation

A combination of qualitative comparative analysis (QCA), regression analysis, and simulation was used to cross-validate the findings. Given the novelty of testing combinations of independent variables based on cases, this study needed a research design that was positioned 'mid-way' between a purely deductive variable-oriented one and a purely inductive case-based one (Fiss, 2011). Fuzzy-set qualitative comparative analysis (fsQCA) was best suited for this type of research as it integrates the strengths of the variable and case-based approaches (Ragin, 2008), thus enabling the exploration of causal configurations in empirical cases.

FsQCA was deployed for the main analysis for three reasons. First, because it examines how different combinations of causal factors (independent variables) correlate with the outcome (in this case, operational performance). While regression analysis can isolate the effect of individual factors, fsQCA captures equifinality, which enables the testing of all combinations associated with the outcome (Blackman et al., 2011). Second, because, whilst methods such as cluster analysis and deviation scores can detect distinct sets of clauses, they do not explain how these work together (Fiss, 2011). In contrast, fsQCA retains sensitivity to the nature of the relations between variables (i.e. complementarity and substitution) (Byrne and Ragin, 2009). Third, because fsQCA provides reliable results for small-to-medium sized samples (10–50 cases) (Misangyi et al., 2017; Schneider and Wagemann, 2012).

In addition, fuzzy set analysis suits the study's context and data in two ways. First, unlike in crisp sets, the membership of a variable in a set can be expressed in degrees, which is especially useful for our hypotheses and data. This is because the question of what constitutes a 'combination of clauses' and 'effect on performance' does not have a yes or no answer. The theoretical direction is that most contracts use a variety of clauses in different proportions; thus, binary scores of 'yes' or 'no' in relation to the presence of clauses and of their effects on the outcome will not reveal much. To test our hypotheses in a meaningful way, the independent variables' degrees of set-membership and of effect on outcome needed to be scored. In addition, the data

came from contracts and interviews and thus constituted an archive of social data that required nuanced measurement in degrees. Second, fuzzy-set analysis enables the accurate testing of explicit hypotheses, while the crisp-set form is more attuned to exploratory analysis through more general and vague propositions. The fsQCA method restricts the analysis of necessity to the essential deductive testing of previously defined factors or theoretically disjunctions (Schneider and Wagemann, 2010). This enables the testing of predefined expectations on necessary variables or disjunctions of variables.

In brief, the fsQCA approach matched the nature of the research question, the data, and the context. However, because the sample was medium-sized, assessments were needed to ensure reliability and to double-check the correlations. This is why multiple regression and simulation were used to check the robustness of the fsQCA analyses and to ensure a sufficient grasp of the details at the root level (Rohlfing, 2016). Specifically, multiple regression, fsQCA, and simulation were used in a complementary fashion - which was made possible by these methods' different (linear/set-case based) assumptions (Misangyi et al., 2017) - in a mixed-method research design (Rohlfing, 2016). In addition, imperfect case knowledge made simulation appropriate for the evaluation of fsQCA as, in such situations, simulation provides a general and balanced picture of the sensitivity of fsQCA to modeling decisions or to data-related features (Rohlfing, 2016; Marx and Dusa, 2011). In addition, simulation has been used before to assess whether or not a configuration is significant (Skaaning, 2011). To summarize, the benefit of combining fsQCA with multiple regression and simulation is that it provides a holistic picture of the validity of QCA results through cross-validation (Fiss, 2011), and enables the detection of potential difficulties or inefficiencies linked to sample size and correlational inferences.

3.2 Data collection

FsQCA is optimally positioned to compare variables from multiple cases that share characteristics while also presenting a few background differences (Rihoux and Ragin, 2009: 24-25). Hence, the projects selected for our sample had to have the following similarities: (i) they needed to be large scale projects with multiple and diverse partners; (ii) the project partnerships had to be between one buyer/sponsor and multiple suppliers/contractors; (iii) they had to be controlled by a national or supranational public-sector buyer or sponsor; (iv) they had to feature similarly high levels of dependency of the contractors upon the buyer/sponsor; and (v) the contractors had to be subject to tendering, selection, and monitoring control procedures and legislation.

Based on the similarity criteria, 45 multi-partner projects were selected: (i) two UK Public Private Partnership (PPP) projects; (ii) three European Public Health projects (EARSS); (iii) 14 ICT/eTen Health Framework projects; and (iv) 26 international healthcare projects offering healthcare relief in disaster conditions (e.g. earthquakes and floods).

Overall, 98 semi-structured interviews were conducted involving a common set of questions with senior managers, professional sub-contractors (e.g., medical, technical) and key suppliers (for background details please see Appendix 2 and 3). The timing of the interviews varied from 45 minutes to four hours, depending on the number of people interviewed and on the level of detail of the information provided by each interviewee. The number of interviews per project varied according to the number of partners involved in each partnership (for instance, PPP projects had dozens of partners, and hence more interviews were required). Each investigated project involved public and private partners. The interviewees were chosen through purposive sampling: the key individuals interviewed had been involved in writing and operationalizing the contracts, held managerial positions within the projects and had knowledge of the outcomes. To gain a holistic perspective, efforts were made to ensure consistency in interviewing all key parties in each contract. The interviewers followed a semi-structured interview guide and most interviews were conducted between a single interviewer and a single interviewee. In a few cases, two interviewers

were present. Projects are usually assessed in terms of cost, time, and scope, and the interviewed managers were all well trained in and familiar with this type of assessment and were able to talk about performance. The interviewees understood and described the contract parts and processes and the types of clauses. They did not have any objections in relation to the types of contract clauses and to the types of agreements (further information is provided in Appendix 3). The semi-structured interview data were also triangulated with secondary data (e.g. independent reports about the projects) to ensure that objective OP measurements were obtained.

3.3 Measures, coding and checking for heterogeneity

Fuzzy sets allow for degrees of membership of categories. They record a value of 1 for full membership of a set, zero for total non-membership, and a fuzzy score ranging between the two extremes for any intermediate degree of membership - the point of maximum ambiguity. A fuzzy score of 0.75 might mean, for example, that an element is 'mostly in' the set. Fuzzy scores were used (Table 2) to assign a value to each set of clauses in each contract. According to these scores, full membership (1) means that all of the clauses of a particular type were present in the contract. Coincidence with non-membership (0) of another type would have meant that this case was a purely relational or purely classical contract (which did not happen in this study). Below are the membership measures for the independent and dependent variables.

<Please insert Table 2 here>

3.3.1 Measuring the clauses

The constructs for the independent variables are based on the sets of clauses in Table 1. There are three sets of clauses — classical, relational and associational. A four fuzzy score–scale (Ragin, 2008: 31, see Table 2 upper box) was chosen to measure each set of clauses by scoring the frequency of their use in the contracts—as taken from the contract templates. The fuzzy scale had values that ranged from full membership to non-membership: most frequent (1 = full membership); mostly frequent (0.67 =

16

mostly in); the crossover point (0.50 = ambiguous membership); less frequent (0.33 = mostly out), and non-frequent (0 = full non-membership) (Rihoux and Ragin, 2009; Ragin, 2008).

3.3.2 Measuring the outcome (operational performance)

The dependent variable for OP consists of the Iron Triangle construct, which consists of three performance measures (time, cost, and scope). This has been widely adopted and used to measure project performance both in academic studies and in practice across different project industries (e.g. construction, engineering, healthcare, and information technology) (Ika, 2009). These three performance measures are consistently present in different types of project contracts (Serrador and Turner, 2015). To preserve consistency in measurement, OP was therefore assessed in terms of time, cost, and scope. Time-based indicators were used, including deliveries on project completion time, timely communication, and coordination, cost-based indicators such as operations, purchase, financial, and transportation costs, and scope-based indicators in the form of satisfaction of project aims and of stakeholder expectations. The OP of each project was evaluated in terms of the average of these three indicators measured on a three-value fuzzy scale (Ragin, 2008: 31; Table 2), based on the data pertaining to performance collected via interviews and secondary data.

The values on the fuzzy scale chosen to measure OP were as follows (Table 2, lower box): (i) Highly successful with little or no problems, change or renegotiations (1= full membership). In other words, the contracts were sufficient and there were no changes in terms of cost, time, or scope; (ii) A vague situation with several problems and some renegotiations in relation to any of the three performance criteria, which, however, did not lead to complete rewrite or collapse (0.50 = ambiguous membership).; (iii) Low performance or not successful, referring to situations in which parts of the contract had not been fulfilled (0 = full non-membership) (Rihoux and Ragin, 2009; Ragin, 2008).

3.3.3 Coding

The following steps were followed to code the data according to the measures described in the previous section:

1. Each contract was examined and the numbers of clauses in each set used in it were scored (based on the sets in Table 1].

2. Fuzzy scores were used (Table 2) to assign a value to each set of clauses in each contract. We also ensured inter-coder reliability. The inter-coder reliability analyses were conducted for the underlying items and the alpha values ranged from 0.96 to 0.98, demonstrating a high degree of agreement between coders (Compton et al., 2012).

3. The interview answers pertaining to the clauses and OP of each project were analyzed. Fuzzy scores were used to assign a value for OP to each project.

4. All the scores were recorded in a project coding Table that was then analyzed.

After the scores from the interviews had been collected, the raw values for each variable were coded according to the fuzzy-scale (Table 2). Any interview input that referred to performance in terms of time, cost, and scope in the transcripts was underlined with a score, according to the fuzzy-scale, and coded in the project coding Table as a raw value. The process was standardized (a few examples were initially jointly coded) so that there would be no disagreement about the scores when they were crosschecked independently. After the scores from the contract templates were collected, the raw values were coded for each variable in the project coding Table.

3.3.4 Heterogeneity and checks

As shown in Table 3, no significant heterogeneity was found between the cases. A mean difference test was conducted to check whether there were any differences in the variable mean values; disaster relief projects (N = 26) versus other category of projects (N = 19). The relative mean (x) and standard deviation (σ) values were not very different, and this was supported by our t-test, which showed no significant differences (p < 0.05) in any of the variables used in further analyses to test the hypotheses. Additionally, a chi-square difference test was conducted in order to check whether the groups were different; they were not significantly so, with the chi-square difference being 1.99 and 3 degrees of freedom. Regarding path levels, both groups produced significant path coefficients. The path coefficients for disaster relief-based projects were β = - 0.46, β = 0.27, and β = 0.30 for classical, relational, and association clauses respectively. In a similar sequence for three clauses, the path coefficients for the other group were β = - 0.52, β = 0.31, and β = 0.30. The relative coefficients were more or less similar and consequently supported the chi-square test results. Also, the control variables such as the number of partners, years of contracting, value, and number of partners interviewed were insignificant.

<Please insert Table 3 here>

3.4 The analysis procedure

The fsQCA analysis procedure, based on that developed by Ragin (1987), is shown in Figure 1 at the end of this section. First, the models that would be tested for each hypothesis were decided upon. Then, the cases that shared the appropriate characteristics were selected and the data collection protocol was built (see interview Table in Appendix 2). Finally, after coding the variables (as above), consistency and calibration thresholds were chosen for each variable according to the indirect cluster method (Thiem and Dusa, 2012: 54-58).

This calibration method was chosen because it enables the thresholds to be decided based on the clustering of the values of each variable by means of a procedure first introduced by Ragin (2008). The indirect method assumes a vector of

thresholds that cuts the original data into equal intervals and then the application of a (quasi)binomial logistic regression with a fractional polynomial equation. This method gives calibration values that are more representative of the trends within the data, rather than directly setting a 'most likely' calibration threshold. Before the analysis could be undertaken, the calibrated Table had to be confirmed with regression and simulation tests. With proper values verified, the next step was to test these values in two ways: first for necessary and then for sufficient combinations, with a minimum consistency of 0.75 and inclusion of 0.60 (the values suggested for reliable results by Schneider and Wagemann, 2012).

FsQCA uses two types of tools for testing hypotheses—necessity and sufficiency—that are conceptualized in set-theoretic terms. Whenever a causal factor is necessary (but not sufficient) for an outcome, the instances of the outcome form a subset of those of the causal factor. A necessary factor is a cause that must be present for the outcome to occur all or most of the time. Although its presence does not mean that the outcome will occur, its absence means that the outcome will not occur all or most of the time. A sufficient factor is one which, when present, ensures that the outcome will occur all or most of the time. Whenever a casual condition is sufficient (but not necessary) to an outcome, the instances of the causal condition form a subset of those of the outcome. Like necessary factors, sufficient ones are not absolute.

There are two measures suited to assess the goodness-of-fit of both necessary and sufficient tests-consistency and coverage-which are measured on a range from 0.0-1.0. Consistency measures the strength of the test. A score of 1.0 indicates that, whenever the outcome is present, the necessary variable is too. Scores of less than 1.0 indicate a corresponding degree of inconsistency. For example, a score of 0.95 would show that whenever the outcome is present, the factor is "almost always" present. A generally accepted rule-of-thumb is that necessity and sufficiency are indicated when consistency is equal to or greater than 0.75, but not otherwise.

A coverage score of 1.0 indicates that whenever the necessary variable is present, the outcome is present. Coverage scores are an indication of the empirical relevance of a configuration of variables to the cases; this, in turn, can be understood as being

an indicator of its importance. Regarding the coverage of configurations, the lower its score, the less empirically relevant a causal configuration is. That means, it is able to explain fewer cases in which the outcome occurred. The generally accepted rule-of-thumb is that coverage score should not be lower than 0.5 (Ragin, 2008).

The necessity tests were performed first, followed by the sufficiency ones. When testing for sufficiency, a truth table is constructed to show the scores of all possible combinations plus single variables. The truth table has 2^n rows, where n equals the number of independent variables. As there were three independent variables, the truth table had 8 tests. Each observation from the dataset was sorted into one row in the truth table, based on its membership scores. A truth table provides a typology, grouping similar observations together, and the rows of the truth table are called configurations.

A truth table goes through a procedure, called minimization, for which there are three outcomes: 'complex solution', 'intermediate solution', and 'parsimonious solution' (Ragin, 2008). These represent different levels of simplification ranging from most conservative (complex) to most aggressive (parsimonious). Parsimonious expressions retain all complexity in data; they are simply those rows of the truth table where the outcome equals 1, including configurations that are not linked to observations. Complex solutions, on the other hand, remove all the outcomes that are ambiguous. Parsimonious solutions are often overly simplistic, but can provide the lowest level of causal complexity generated by reanalyzing the truth table with the set of 'remainder' rows (combinations lacking good instances). Ragin and Sonnett (2005) stated that 'complex' (or detailed) solutions eliminate all logical remainders, which are "combinations of causal factors that lack empirical instances" (Ragin, 2008: 155). Intermediate solutions are based on carefully justified counterfactual arguments (Schneider and Wagemann, 2012; Ragin, 2008). All three tests were conducted and then all three solutions were observed to evaluate the outcome. In this case, the results were then validated by means of multiple regression and simulation tests.

<Please insert Figure 1 here>

4. Results

4. 1 Descriptive statistics and quality checks

First, the descriptive statistics and correlation matrix produced for the sets of clauses are presented in Table 4. The calibrations produced mean values for the clauses ranging from 0.36 to 0.61, thus showing good close ranges that may result in significant associations. The matrix provides an indication of the significant correlation that exists between clauses and high OP, with all values being significant at $p < 0.01$. Specifically, relational and associational clauses are strongly positively correlated both with OP and with each other, whilst classical clauses show inverse relations with all the other variables.

<Please insert Table 4 here>

4.2 The fsQCA results and hypotheses validation

The necessity tests are shown in Table 5. Hypothesis 1 posits that classical and relational clauses combine in complementary ways to realize high OP. This hypothesis is not supported, as models 1, 4, 5, and 7 show that classical clauses are not complementary to relational ones, but that associational clauses appear to take their place instead. Hypothesis 2 speculates that relational and associational clauses are positively related to high OP and, consequently, that they may combine in complementary ways (i.e. moderating) to realize high OP. This hypothesis is addressed in two parts. First, whether both clauses are positively related to high OP. Models 2 and 3 support the former statement, and models 6 and 7 support the latter. Second, as can be seen in Table 5 (i.e. sufficiency results and models), Hypothesis 1 is again not supported, whilst hypothesis 2 is corroborated. Three solutions (complex, intermediate and parsimonious) that provide proof against our hypotheses are presented. These represent combinations that are sufficient for the outcome to occur, each being based on different assumptions and each presenting specific differentiating characteristics as follows. The complex solution is the most conservative, as it does not allow for logical remainders and assumptions to be included. The intermediate solution incorporates only 'easy' counterfactuals, and is

the simplest to interpret. The parsimonious solution allows all counterfactuals, both 'easy' and 'difficult' ones. The reason why all three solutions are used here is that they can corroborate or falsify each other, as suggested by Ragin (2008). The complex solution shows a prominent combination (~classical * RELATIONAL * ASSOCIATIONAL) that also corroborates the result found in the necessity test. Classical and relational clauses substitute one another (take each other's place), whilst relational and associational clauses combine in complementary ways (RELATIONAL * ASSOCIATIONAL). The associational clauses alone (based on the intermediate solution) also depict strong evidence of high OP. Moreover, the combinations correlate with high OP with a very high level of consistency (> 0.90).

<Please insert Table 5 here>

4.3 Multiple regression and simulation results for hypotheses cross-validation

Table 6 provides a summary of the regression results. The final models (i.e. ~classical; classical * RELATIONAL, ~classical * RELATIONAL * ASSOCIATIONAL) for Hypothesis 1 (i.e. the combination of classical and relational clauses complementing each other and being positively correlated with high OP) and the models (RELATIONAL; ASSOCIATIONAL; RELATIONAL * ASSOCIATIONAL) for Hypothesis 2 (i.e. the combination of associational and relational clauses being positively correlated with high OP) were cross-validated through multiple regression and simulation. The regression analysis revealed that classical clauses negatively affect high OP, with β = - 0.50, t-value = - 5.16 and p = 0.000. Relational and associational clauses positively affect OP (β = 0.27, t-value = 3.52 and p = 0.001 for relational clauses and β = 0.29, t-value = 2.81 and p = 0.008 for associational ones; R^2 = 82% and adjusted-R^2 = 81%). The moderation results for Hypothesis 1 are not supported. The interactions of ~classical * RELATIONAL and ~classical * RELATIONAL * ASSOCIATIONAL show negative effects, with β = - 0.65, t-value = - 5.90 and p = 0.00; β = - 0.24, t-value = - 2.10 and p = 0.04 respectively. This enables to conclude that classical clauses do not complement or that combinations of classical and relational classes are not positively correlated with high OP.

23

Hypothesis 2 posits that combinations of associational clauses with relational ones are positively correlated to high OP, and is supported with β = 0.60, t-value = 8.89 and p < 0.001. Additionally, no multi-collinearity issues were found. The collinearity tolerance values were greater than 0.40, which are well above the cut-off criterion of 0.20. Specifically, the values for classical, relational and associational clauses were 0.46, 0.73 and 0.41, respectively. Moreover, the variance inflation factors were 2.16, 1.37 and 2.44, which are substantially lower than the recommended cut-off criterion of 10 (Dormann, 2013; O'Brien, 2007).

<Please insert Table 6 here>

The simulation analysis with n = 320 produced similar outcomes for the main contract clauses: classical (β = - 0.43 and t-value = - 8.55), relational (β = 0.16 and t-value = 3.070) and associational (β = 0.33 and t-value = 6.50). Similarly, the moderation results were corroborated and support Hypothesis 1 (~classical * RELATIONAL * ASSOCIATIONAL, β = - 0.27 and t-value = - 4.68) and Hypothesis 2 (RELATIONAL * ASSOCIATIONAL, β = 0.53 and t-value = 9.40). All relationships were also found to be significant at p < 0.001. This triangulation with the regression and simulation analysis provided a comprehensive testing procedure for the models.

5. Discussion

Project contracts are often incomplete and have serious performance issues. The argument that neither classical nor relational contracts are adequate to realize high OP was followed. The argument, drawn from contracting theory (e.g. Sumo et al., 2016; Wacker et al., 2016; Caldwell and Howard, 2014; Hartmann et al., 2014; Kalkancı et al., 2014; Smith and King, 2009), that classical and relational contracts should be combined in order to overcome incompleteness and achieve high OP was also adopted. This study has elaborated upon the theoretical framework of contractual incompleteness by testing combinations of three contract clauses to find which ones drive high OP.

5.1 Theoretical implications

This study contributes to the theory of contractual complementarity, specifically in the context of project contracting. The analysis produced two theoretical implications: first, that relational and classical contract clauses in project contracts are not complementary; and second, that more complete project contracts are created when combining relational with associational contract clauses that complement each other.

First theoretical implication - The results have shown that combinations of classical and relational contract clauses do not lead to high OP and act as substitutes; this may be attributed to the characteristics of projects, which are different from other types of operations. In contrast to prior research that investigated incompleteness, the results of this study show that project stakeholder and supply chain relationships do not share the characteristics found in long-term inter-organizational relationships of operations organizations (Curlee and Gordon, 2011; Oltra et al., 2005; Davies and Brady, 2000). Specifically, projects are temporary organizational forms that are subject to stringent time pressures, to difficulties in establishing relational mechanisms (trust, authority, norms), and to high levels of change and contingency. Often, project relationships are highly adversarial, and trust between partners needs to be built swiftly. Projects are characterized by high operational risks and their timeframes are often unstable (Gil, 2009; Skaates et al., 2002).

Therefore, the findings may be partly explained by the temporary nature of project relationships, which often cease when projects finish. Thus, a partner may not be more incentivized to share risks as they may not be in a repeating long-term business relationship. There is also insufficient time to develop strong norms and strong authority patterns, making coordination more difficult. Coordination therefore demands that partners retain a high degree of flexibility to handle change. However, classical clauses, which are designed to bring stability and control in a transaction, run contrary to the need to manage change often. Extant studies that have focused on project contracts and partnerships have found that partners who constantly deal with changes in project plans are faced with high rates of litigation between contractors, and very often fail in achieving cost, time, and/or specification performance targets (e.g., Roehrich and Lewis, 2012; Zheng et al., 2008). On the other hand, relational

contract clauses are weak because of the lack of extra-contractual mechanisms that could reinforce the agreement, as discussed above. It seems that, when these two types of contract clauses are combined in project contracts, they do not complement each other's virtues but, rather, enhance each other's weaknesses, therefore not leading to high OP.

Second theoretical implication - The results show a second theoretical contribution - namely, that associational and relational contract clauses have complementary effects and are both substitutes to classical contract clauses. Relationships in projects are characterized by shorter time-spans, less capacity for control, and higher risk; thus, they require higher operational flexibility. Because of the above, relationships in projects are often more susceptible to contingencies and risk than those found in other types of operations (Gil, 2009; Skaates et al., 2002). These higher levels of contingency and risk, in turn, add higher pressure for operational flexibility. The results of hypothesis 2 show that associational contract clauses provide the flexibility required (Mellewigt et al., 2012), playing a significant role in project contracts by supporting relational contract clauses in the development of better coordination (Remington, 2011). In order to counteract some of their limitations and to realize high OP, relational contract clauses - which are often vague and low in specificity (Sumo et al., 2016) - can be combined with associational contract clauses.

In this sense, the combination of relational and associational contract clauses can counteract the inefficiencies inherent in relational contracting (Winch, 2010). This result shows a possible connection with risk and devolution in contract clauses, which links to the capability to adapt decision-making in risky environments. The result is that project contracts should adopt associational contract clauses in which a 'core' of flexible decision processes is complemented by a 'belt' of mainly relational contract clauses.

5.2 Further research

Whilst this study offers promising findings, it does, however, have t limitations: First, it has a single sector focus (the sample projects dealt with several aspects of healthcare services), and second, it draws its data from a medium-sized sample. Nevertheless, this study's research design can be replicated in other settings (different industries and types of projects) and the results could increase the generalizability of and build on its findings. Regarding sample size, QCA is applicable to both small/medium and large samples. However, it is important to cross-validate the results with other techniques.

As the emerging body of literature on how contracts and contract clauses can be combined grows, the findings present manifold future research opportunities. Further research should test the relationship between operational flexibility and the combination of associational with relational contract clauses. This line of research could investigate how best to address the problem of operational flexibility in projects. Flexibility has strong links to risk, uncertainty, and complexity stemming from both the project environment and contracts. Future studies need to perform multivariate analysis of the complex relationship between contracts, flexibility and high OP.

Also, it is not enough that contracting partners know which contract clauses to use. Further studies could investigate the degrees of influence and impact that different types of risk and temporality have on the effectiveness and structure of project contracts in relation to decision-making (Cannon et al., 2000). This would be a test of the moderation effects of risk and complexity on the relationship between contracts and high OP. Future work on contracting cannot offer solutions to contractual incompleteness unless more nuanced studies test multiple combinations of contract clauses. For example, future research efforts may want to investigate which combinations of core or belt contract clauses (from Table 1) exhibit the highest complementary effects. Finally, future research may also investigate power between different contracting partners and how power influences the combination of contract clauses and their impact OP.

5.3 Managerial implications

The managerial implications of this study include a more thorough understanding of the use of contract clauses. Contracting in projects has been a fundamental, but problematic, area for managers and policymakers, who continue to struggle to achieve high performance in terms of time, cost, and scope. The findings present implications for those project managers who seek to overcome the effects of contract incompleteness when governing various project relationships. The development of a more complete - or, at least, less ineffective - contract entails the understanding of how to customize contract clauses to elicit adaptive reactions in future contingencies.

Moreover, managers often adopt classical contracts as their preference lies towards risk avoidance by means of penalty clauses. With project transactions changing over time, managers are required to adopt a more flexible approach to solve operational problems. Different combinations of contract clauses can help to tackle different operational changes. For instance, when purchasing requirements or inventory levels change, the use of associational clauses related to resource acquisition could be useful to realize OP.

6. Conclusion

The study contributes to two research areas: (i) the theory of contractual incompleteness and complementarity; and (ii) project contracting. Hypotheses pertaining to combinations of classical, relational, and associational contract clauses were derived from theory and tested on data collected from 45 projects. The results have shown that high operational performance is achieved when relational and associational contract clauses are combined. Moreover, classical and relational contract clauses are substitutes in project contracts when realizing high OP and, hence, should not be combined. The study's key implication is that theory in contractual incompleteness with regards to project contracts should be directed towards combinations that include associational contract clauses. This study has

increased our understanding of contractual incompleteness and complementarity and of how it relates to operational performance in projects.

References

Argyres, N.S. and Mayer, K.J. (2007), "Contract design as a firm capability: An integration of learning and transaction cost perspectives", *Academy of Management Review*, Vol. 32 No. 4, pp. 1060-1077.

Anderson, S.W. and Dekker, H.C. (2005), "Management control for market transactions: The relation between transaction characteristics, incomplete contract design, and subsequent performance", *Management Science*, Vol. 51 No. 12, pp.1734-1752.

Battigalli, P. and Maggi, G. (2002), "Rigidity, discretion, and the costs of writing contracts", *American Economic Review*, Vol. 92 No. 4, pp.798-817.

Blackman, T., Wistow, J. and Byrne, D. (2011), "A qualitative comparative analysis of factors associated with trends in narrowing health inequalities in England", *Social Science and Medicine*, Vol. 72 No. 12, pp. 1965-1974.

Brandon-Jones, A. and Carey, S. (2011), "The impact of user-perceived e-procurement quality on system and contract compliance", *International Journal of Operations and Production Management*, Vol. 31 No. 3, pp. 274-296.

Broekhuis, M. and Scholten, K. (2018), "Purchasing in service triads: The influence of contracting on contract management", *International Journal of Operations and Production Management*, Vol. 38 No. 5, pp. 1188-1204.

Byrne, D. and Ragin, C.C. (2009), *The Sage Handbook of Case-Based Methods*, CA: Sage Publications Inc.

Caldwell, N.D. and Howard, M.B. (2014), "Contracting for complex performance in markets of few buyers and sellers: The case of military procurement", *International Journal of Operations and Production Management*, Vol. 34 No. 2, pp. 270-294.

Cannon, J.P., Achrol, R.S. and Gunslach G.T. (2000), "Contracts, norms, and plural form governance", *Journal of Academy of Marketing Science*, Vol. 28 No. 2, pp. 180-194.

Compton, D.L., Love, T.P. and Sell, J. (2012), "Developing and assessing inter-coder reliability in studies of group interaction", *Sociological Methodology,* Vol. 42 No 1, pp. 348-364.

Curlee, W.R. and Gordon, R.L. (2011), *Complexity Theory and Project Management*, Wiley and Sons Inc., New Jersey USA.

Davies, A. and Brady, T. (2000), "Organisational capabilities and learning in complex product systems: towards repeatable solutions", *Research Policy*, Vol. 29 No. 7, pp. 931-953.

Eggleston, K., Posner, E.A., and Zeckhauser, R. (2000), "Design and interpretation of contracts: Why complexity matters", *Northwestern University Law Review*, Vol. 95, pp. 91.

Ennen, E. and Richter, A. (2010), "The whole is more than the sum of its parts - or is it? A review of the empirical literature on complementarities in organizations ", *Journal of Management*, Vol. 36 No. 1, 207-233.

Faems, D., Janssens, M., Madhok, A. and Van Looy, B. (2008), "Toward an integrative perspective on alliance governance: Connecting contract design, trust dynamics, and contract application", *Academy of Management Journal*, Vol. 5 No. 1, pp. 1053-1078.

Essig, M., Glas, A. H., Selviaridis, K. and Roehrich, J. K. (2016), "Performance-based contracting in business markets", *Industrial Marketing Management*, Vol. 59, pp. 5-11.

Fiss, P. C. (2011), "Building better causal theories: A fuzzy set approach to typologies in organization research", *Academy of Management Journal*, Vol. 54 No. 2, pp. 393-420.

Furlotti, M. (2007), "There is more to contracts than incompleteness: a review and assessment of empirical research on inter-firm contract design", *Journal of Management and Governance*, Vol. 11 No. 1, pp. 61-99.

Gil, N. (2009), "Developing cooperative project client-supplier relationships: How much to expect from relational contracts?", *California Management Review*, Vol. 51 No. 2, pp. 144-169.

Grandori, A. (2010), "Asset commitment, constitutional governance and the nature of the firm", *Journal of Institutional Economics*, Vol. 6 No. 3, 351-375.

Grandori A. and Furlotti, M. (2009), "Facio ut facias", *International Studies of Management and Organization*, Vol. 39 No. 4, pp. 81-100

Grandori, A. and Furlotti, M. (2006), "The Bearable Lightness of Inter-firm Strategic Alliances: Resource-based and Procedural Contracting", In: Ariño, A. and Reuer J. J. (eds.), *Strategic Alliances: Governance and Contracts*. Palgrave Macmillan, New York, USA.

Granovetter, M. (1985), "Economic action and social structure: The problem of embeddedness", *American Journal of Sociology*, Vol. 91 No. 3, pp. 481-510.

Grossman, S.J. and Hart, O. D. (1986), "The costs and benefits of ownership: A theory of vertical and lateral integration", *Journal of Political Economy*, Vol. 94 No. 4, pp. 691-719.

Hagedoorn, J. and Hesen, G. (2007), "Contract law and the governance of inter-firm technology partnerships - An analysis of different modes of partnering and their contractual implications", *Journal of Management Studies*, Vol. 44 No. 3, pp. 342-366.

Hart, O. (1995), "Corporate governance: Some theory and implications", *The Economic Journal*, Vol. 105 No. 430, pp. 678-689.

Hart, O. and Moore, J. (1990), "Property rights and the nature of the firm", *Journal of Political Economy*, Vol. 98 No. 6, pp. 1119-1158.

Hartmann, A., Roehrich, J.K., Frederiksen L. and Davies, A. (2014), "Procuring complex performance: the transition process in public infrastructure", *International Journal of Operations and Production Management*, Vol. 34 No. 2, pp. 174 – 194.

Henisz, W. J., Levitt, R.E. and Scott, W.R. (2012), "Toward a unified theory of project governance: economic, sociological and psychological supports for relational contracting", *Engineering Project Organization Journal*, Vol. 2 No. 1-2, pp. 37-55.

Howard, M.B., Roehrich, J.K., Lewis, M.A. and Squire, B. (2018), " Converging and diverging governance mechanisms: The role of (dys)function in long-term inter-organizational relationships", *British Journal of Management*, *forthcoming*.

Ika, L.A. (2009), "Project success as a topic in project management journals", *Project Management Journal*, Vol. 40 No. 4, pp. 6-19.

Kalkancı, B., Chen, K.Y. and Erhun, F. (2014), " Complexity as a contract design factor: A human-to-human experimental study", *Production and Operations Management*, Vol. 23 No. 2, pp. 269–284.

Kimel, D. (2007), "The choice of paradigm for theory of contract: Reflections on the relational model", *Oxford Journal of Legal Studies*, Vol. 27 No. 2, pp. 233–255.

Klein Woolthuis, R., Hillebrand, B. and Nooteboom, B. (2005), "Trust, contract and relationship development", *Organization Studies*, Vol. 26, pp. 813-840.

Lewis, M.A. and Roehrich, J.K. (2009), "Contracts, relationships and integration: towards a model of the procurement of complex performance", *International Journal of Procurement Management*, Vol. 126, No. 2, pp. 125-142.

Lui, S.S. and Ngo, H.Y. (2004), "The role of trust and contractual safeguards on cooperation in non-equity elliances", *Journal of Management*, Vol. 30 No. 4, pp. 471-485.

Lumineau, F. and Malhotra, D. (2011), "Shadow of the contract: How contract structure shapes interfirm dispute resolution", *Strategic Management Journal*, Vol. 32 No. 5, pp. 532-555.

Luo, Y. (2002), "Contract, cooperation, and performance in international joint ventures", *Strategic Management Journal*, Vol. 23, No. 10, pp. 903–19.

MacCormack, A. and Mishra, A. (2015), "Managing the performance trade-offs from partner integration: Implications of contract choice in R&D projects", *Production and Operations Management*, Vol. 24 No. 10, pp. 1552–1569.

MacLeod, W. B. (2000), "Complexity and contracting", *Revue D'Iconomie Industrielle*, Vol. 92, pp. 149-78.

MacNeil, I. R. and Campbell, I. D. (2001), *The Relational Theory of Contract: Selected Works of Ian MacNeil*, Sweet and Maxwell, London, UK.

Macneil, I. R. (1999), "Relational contract theory: Challenges and queries", *NorthWestern University Law Review*, Vol. 94 No. 3, pp. 877-908.

March, J.G., Schulz, M. and Zhou, X. (2000), *The Dynamics of Clauses: Change in Written Organizational Codes*, Stanford University Press, San Francisco, USA.

Marx, A. and Dusa, A. (2011), "Crisp-set qualitative comparative analysis (csQCA), contradictions and consistency benchmarks for model specification", *Methodological Innovations Online*, Vol. 6 No. 2, pp. 103-148.

Mayer, K.J. and Bercovitz, J. (2008), "The influence of inertia on contract design: contingency planning in information technology service contracts", *Managerial and Decision Economics*, Vol. 29 No. (2-3), pp.149-163.

Mayer, K.J. and Teece, D.J. (2008), "Unpacking strategic alliances: The structure and purpose of alliance versus supplier relationships", *Journal of Economic Behavior and Organization*, Vol. 66 No. 1, pp.106-127.

Mayer, K.J. (2004), "*The Role of Prior Relationships on Contract Design: An Analysis of Early Termination Provisions*", University of Southern California, Los Angeles, USA.

Maylor, H. and Turner, N. (2017), "Understand, reduce, respond: project complexity management theory and practice", *International Journal of Operations and Production Management,* Vol. 37 No. 8, pp.1076-1093.

Mellewigt, T., Decker, C. and Eckhard, B. (2012), "What drives contract design in alliances? Taking stock and how to proceed", *Zeitschrift für Betriebswirtschaft*, Vol. 82 No. (7-8), pp. 839-864.

Milgrom, P.R. and Roberts, J. (1995), "Complementarities and fit strategy, structure, and organizational change in manufacturing". *Journal of Accounting and Economics*, Vol. 19 No. (2-3), pp. 179-208.

Misangyi, V.F., Greckhamer, T., Furnari, S., Fiss, P. C., Crilly, D. and Aguilera, R. (2017), "Embracing causal complexity: The emergence of a neo-configurational perspective", *Journal of Management*, Vol. 43 No. 1, pp. 255-282.

Mouzas, S. and Blois, K. (2013), "Contract research today: Where do we stand?", *Industrial Marketing Management*, Vol. 42 No. 7, pp. 1057-1062.

Ng, I.C.L. and Nudurupati, S.S. (2010), "Outcome-based service contracts in the defense industry, mitigating the challenges", *Journal of Service Management*, Vol. 21 No. 5, pp. 656-674.

Oltra, M.J., Maroto, C. and Segura, B. (2005), "Operations strategy configurations in project process firms", *International Journal of Operations and Production Management,* Vol. 25 No. 5, pp. 429-448.

Poppo, L. and Zenger, T. (2002), "Do formal contracts and relational governance function as substitutes or complements?", *Strategic Management Journal*, Vol. 23 No. 8, pp. 707-725.

Puranam, P. and Vanneste, B. S. (2009), "Trust and governance: Untangling a tangled web", *Academy of Management Review*, Vol. 34 No. 1, pp. 11-31.

Ragin, C. C. (1987), *Trust and Governance: Untangling A Tangled Web*, University of California Press, Berkeley, USA.

Ragin, C. C. (2008), *Redesigning Social Inquiry: Fuzzy Sets and Beyond*, University of Chicago Press, Chicago, USA.

Ragin, C. C. and Sonnett, J. (2005), "Between Complexity and Parsimony: Limited Diversity, Counterfactual Cases, and Comparative Analysis". In: Kropp, S. and Minkenberg, M. (eds.), *Vergleichen in der Politikwissenschaft* (pp. 180-197), VS Verlag für Sozialwissenschaften. Wiesbaden, Germany.

Remington, K. (2011), *Leading Complex Projects*, Burlington, USA: Gower Pub.

Reuer, J.J. and Ariño, A. (2007), "Strategic alliance contracts: Dimensions and determinants of contractual complexity", *Strategic Management Journal*, Vol. 28 No. 3, pp. 313-330.

Rihoux, B. and Ragin, C.C. (2009), *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques,* CA: Sage Publications Inc.

Roehrich, J.K. and Lewis, M.A. (2014), "Procuring complex performance: Implications for exchange governance complexity", *International Journal of Operations and Production Management*, Vol. 34 No. 2, pp. 221-241.

Rohlfing, I. (2016), "Why simulations are appropriate for evaluating qualitative comparative analysis", *Quality and Quantity*, Vol. 50 No. 5, pp. 2073-2084

Ryall, M.D. and Sampson, R.C. (2009), "Formal contracts in the presence of relational enforcement mechanisms: Evidence from technology development projects", *Management Science*, Vol. 55 No. 6, pp. 906-925.

Skaates, M.A., Tikkanen, H. and Lindblom, J. (2002), "Relationships and project marketing success", *Journal of Business and Industrial Marketing*, Vol. 17 No. 5, pp. 389-406.

Schepker, D.J., Oh, W.Y., Martynov, A. and Poppo, L. (2014), "The many futures of contracts: Moving beyond structure and safeguarding to coordination and adaptation", *Journal of Management*, Vol. 40 No. 1, pp. 193-225.

Schneider, C.Q. and Wagemann, C. (2012), *Set-Theoretic Methods for the Social Sciences: A Guide to Qualitative Comparative Analysis*, Cambridge University, Cambridge, UK.

Schneider, C. Q. and Wagemann, C. (2010), "Standards of good practice in qualitative comparative analysis (QCA) and fuzzy-sets", *Comparative Sociology*, Vol. 9 No. 3, pp. 397-418.

Scott, C. (2013), "Ethics consultations and conflict engagement in health care", *Cardozo Journal of Conflict Resolution*, Vol. 15, pp. 363-423.

Serrador, P. and Turner, J. R. (2015), "The relationship between project success and project efficiency", *Project Management Journal*, Vol. 46 No. 1, pp. 30-39.

Selviaridis, K. and Spring, M. (2018), "Supply chain alignment as process: contracting, learning and pay-for performance", *International Journal of Operations and Production Management*, Vol. 38 No. 3, pp. 732-755.

Skaaning, S.E. (2011), "Assessing the robustness of crisp-set and fuzzy-set QCA results", *Sociological Methods and Research*, Vol. 40 No. 2, pp. 391-408.

Smith, D.G. and King, B.G. (2009), "Contracts as organizations", *Arizona Law Review*, Vol. 51, pp. 1-46.

Smith, H.E. (2006), "Modularity in contracts: Boilerplate and information flow", University of *Michigan Law Review*, Vol. 104, pp. 1175-1222.

Sommer, S.C.C. and Loch, H. (2009), "Incentive contracts in projects with unforeseeable uncertainty", *Production and Operations Management*, Vol. 18 No. 2, pp. 185–196.

Stevenson, M. and Spring, M. (2007), "Flexibility from a supply chain perspective: definition and review", *International Journal of Operations and Production Management*, Vol. 27 No. 7, pp. 685-713.

Sumo, R., Valk van der, W., Weele van, A. and Bode, C. (2016), " Fostering incremental and radical innovation through performance-based contracting in inter-organizational relationships", *International Journal of Operations and Production Management*, Vol. 36 No. 11, pp. 1482-1503.

Susarla, A., Barua, A. and Whinston, A.B. (2009), "A transaction cost perspective of the "software as a service" business model", *Journal of Management Information Systems*, Vol. 26 No 2. pp. 205-240.

Thiem, A. and Dusa, A. (2012), *Qualitative Comparative Analysis with R: A User's Guide*, Springer Science and Business Media, Chicago, USA.

Uzzi, B. (1997), "Social structure and competition in interfirm networks: The paradox of embeddedness", *Administrative Science Quarterly*, Vol. 42 No. 1, pp. 35-67.

Vaaland, T.I. and Håkansson, H. (2003), "Exploring interorganizational conflict in complex projects", *Industrial Marketing Management*, Vol. 32 No. 2, pp. 127-138.

Wacker, J.G., Yang, C. and Sheu, C. (2016), "A transaction cost economics model for estimating performance effectiveness of relational and contractual governance: Theory and statistical results", *International Journal of Operations and Production Management*, Vol. 36 No. 11, pp. 1551-1575.

Weber, L. and Mayer, K. J. (2011), "Designing effective contracts: Exploring the influence of framing and expectations", *Academy of Management Review*, Vol. 36 No. 1, pp. 53-75.

Williamson, O. E. (1999), "Strategy research, governance and competence perspectives", *Strategic Management Journal*, Vol. 20 No. 12, pp. 1087-1108.

Williamson, O. E. (1985). *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*, The Free Press, Macmillan Inc., New York, USA.

Winch, G. M. (2010), *Managing Construction Projects: An Information Processing Approach*, Blackwell Pub, Chichester, UK.

Zheng, J., Roehrich, J. K. and Lewis, M. A. (2008), "The dynamics of contractual and relational governance: Evidence from long-term public–private procurement arrangements", *Journal of Purchasing and Supply Management*, Vol. 14 No. 1, pp. 43-54.

Zwikael, O. and Meredith, J. R. (2018), "Who's who in the project zoo? The ten core project roles", *International Journal of Operations and Production Management*, Vol. 38 No. 2, pp. 474-492.

6. Tables & Figure

Table 1: Categories of clauses in each type of contract

Table 2: Fuzzy scores

Table 3: Checking the case sample for heterogeneity

Table 4: Descriptive statistics and correlation matrix

Table 5: QCA analysis, models, and hypotheses results

Table 6: Regression results

Figure 1: The analysis steps: combining fsQCA and multiple regression/simulation tests

Constructs (sets)		
Classical Contracts	**Classical Clauses (from theory)**	**Exemplary Sources**
[opportunism driven] Safeguarding, contro and accountability	1. accountability – monitoring -evaluation - performance standards (time, cost and scope) 2. obligations, (asset specificity/IP), confidentiality- exclusivity, property rights 3. payments / prices / rewards / penalties / liabilities 4. dispute resolution - termination procedures	Mallewigt et al. (2012), Argyres and Mayer, (2007); Tiwana (2008); Reuer and Arino (2007); Smith (2006); Ferguson et al. (2005); Poppo and Zenger (2002); Eggleston et al. (2000); March et al. (2000); Speidel (2000); Rindfleisch and Heide (1997)
Relational Contracts	**Relational Clauses (from theory)**	**Exemplary Sources**
[trust driven] Extra-contractual mechanisms = building trust and commitment, risk sharing, authority and norms	1. work division (+ users) – task specificity 2. information flow / process interaction (+ users) 3. meetings, boards, panels, conferences, transaction/interaction frequency 4. negotiation processes, arbitration, dependence 5. alliance clauses, relationship period, expectation of continuity	Smets et al. (2013); Reuer and Arino (2007); Ferguson et al. (2005); Batenburg et al. (2003); Poppo and Zenger (2002); Zollo et al. (2002), Luo (2002); Uzzi (1997); Grandori and Soda (1995); Granovetter (1985)
Associational Contracts	**Associational Clauses (from theory)**	**Exemplary Sources**
[demand or contingency driven] *Regulating decision-making and lock-in resources for this procedure*	1. autonomy to decide on activities/goals and performance targets 2. veto rights *3.* force majeure 4. price adjustment 5. change processes 6. uncertainty (environmental) 7. compelling reason clauses	Mouzas and Blois (2013); Mallewigt et al. (2012); Buuren et al. (2009); Mayer and Bercovitz (2008); Argyres and Mayer (2007); Furlotti (2007); Hagedoorn and Hesen (2007); Carson et al. (2006); Grandori and Furlotti (2006); Smith (2006); Kaplan and Strömberg (2003); Luo (2002); Rindfleisch and Heide (1997)

Table 1: Categories of clauses in each type of contract

Independent variable = Four point fuzzy coding scale (0, 0.33, 0.67, 1) according to Ragin (2008: 31)

There were subsets in each set of clauses (subsets defined in Table 2). The information for the subsets came from contracting studies

4 subsets of classical clauses,

5 subsets of relational clauses and

7 subsets of associational clauses coded

Score		Code according to membership	Classical	Relational	Associational
1	No such clauses in the contract	0 = full non-membership	0 out of 4	0 out of 5	0 out of 7
2	Less than half of the clauses in the contract	0.33 = mostly out	1 out of 4	1 out of 5	1-2 out of 7
3	About half the clauses in the contract	0.50 = crossover point-ambiguous	2 out of 4	2-3 out of 5	3-4 out of 7
4	These clauses are most frequent	0.67 = mostly in	3 out of 4	4 out of 5	5-6 out of 7
5	All of the clauses present in the contract	1 = full membership	4 out of 4	5 out of 5	7 out of 7

Dependent variable—three point scale (0 = low operational performance, 1 = high operational performance) with the inclusion of a cut-off ambiguous point of 0.50 to accommodate mixed results according to Ragin (2008: 31)—the information came from the interviews

	Rank	**Definition agreed with respondent**	Code according to membership
i	Low performance or not successful (LOP)	Parts of the contract were not fulfilled (time, cost or spec) with time or cost loss or the contract needed major changes and renegotiation	0 = full non-membership
Ii	Vague situation (mixed)	Several problems and some renegotiations in relation to any of the three performance criteria, but which did not lead to complete rewrite or collapse	0.50 = crossover point-ambiguous
iii	Highly successful (HOP)	Few or no problems, no changes in terms of cost, time or scope or renegotiations needed in the contract	1 = full membership

Table 2: Fuzzy scores

Contract clauses	Project types	$\bar{x}$	St. Dev	F-test (Levene)	Sign	t-values	Sig (2-tailed)
Classical	HR	0.32	0.22	0.19	0.67	-1.34	0.19
	O	0.41	0.22			-1.34	0.19
Relational	HR	0.60	0.18	1.59	0.21	-0.42	0.68
	O	0.62	0.14			-0.44	0.66
Associational	HR	0.52	0.30	0.75	0.39	0.85	0.40
	O	0.45	0.27			0.86	0.40
Operational performance	HR	0.56	0.25	0.25	0.62	0.90	0.37
	O	0.49	0.26			0.89	0.38

Mean difference test for project types, disaster relief-based projects (HR) & others (O)

Table 3: Checking the case sample for heterogeneity

Contract types/clauses	Calibration thresholds	$\overline{x}$	St. Dev	Min.	Max.	Skew.	Kurt.	C	R	A	OP
Classical (C)	2.5, 3.5, 4.5	0.36	0.22	0.16	0.83	0.22	-1.41	1			
Relational (R)	1.5, 2.5, 3.5	0.61	0.16	0.16	0.83	0.16	0.53	-0.41	1		
Associational (A)	2.5, 3.5, 4.5	0.49	0.29	0.06	0.83	0.28	-1.66	-0.73	0.52	1	
Operational performance (OP)	0.25, 0.75, 1	0.53	0.25	0.16	0.75	0.25	-1.62	-0.83	0.63	0.80	1

$\overline{x}$ (mean); St. Dev (standard deviation); all correlations are significant at $p < 0.01$

Table 4: Descriptive statistics and correlation matrix

Necessity results and models	Incl.	RoN	Cov.r	Models and hypothesis support	*C*	*R*	*A*
1 ~classical	0.98	0.76	0.82	*H1* not supported (model 1)	Ө	-	-
2 RELATIONAL	0.91	0.75	0.79	*H2* supported (model 2)	-	●	-
3 ASSOCIATIONAL	0.84	0.93	0.92	*H2* supported (model 3)	-	-	●
4 ~classical*RELATIONAL	0.90	0.87	0.88	*H1* not supported (model 4)	Ө	●	-
5 ~classical*ASSOCIATIONAL	0.84	0.94	0.93	*H1* not supported (model 5)	Ө	-	●
6 RELATIONAL*ASSOCIATIONAL	0.79	0.97	0.96	*H2* supported (model 6)	-	θ	θ
7 ~classical*RELATIONAL*ASSOCIATIONAL	0.79	0.97	0.96	*H1* not supported, *H2* supported (model 7)	Ө	θ	θ

Sufficiency results, models and solutions	Incl.	PRI	COVS				
Complex (C), intermediate (I), Parsimonious (P)							
1 (C) ~classical*RELATIONAL*ASSOCIATIONAL	0.96	0.92	0.79	*H1* not supported, *H2* supported	Ө	θ	θ
2 (I) ASSOCIATIONAL	0.92	0.85	0.84		-	-	●
3 (P) RELATIONAL*ASSOCIATIONAL	0.96	0.92	0.79	*H2* supported	-	θ	θ

Table reading keys: Classical = C; Relational = R; Associational = A

Ө/~/ lower-case letters = Variables absent; ●/ upper-case letters = Variables present; θ = Variables moderating

Table 5: QCA analysis, models, and hypotheses results

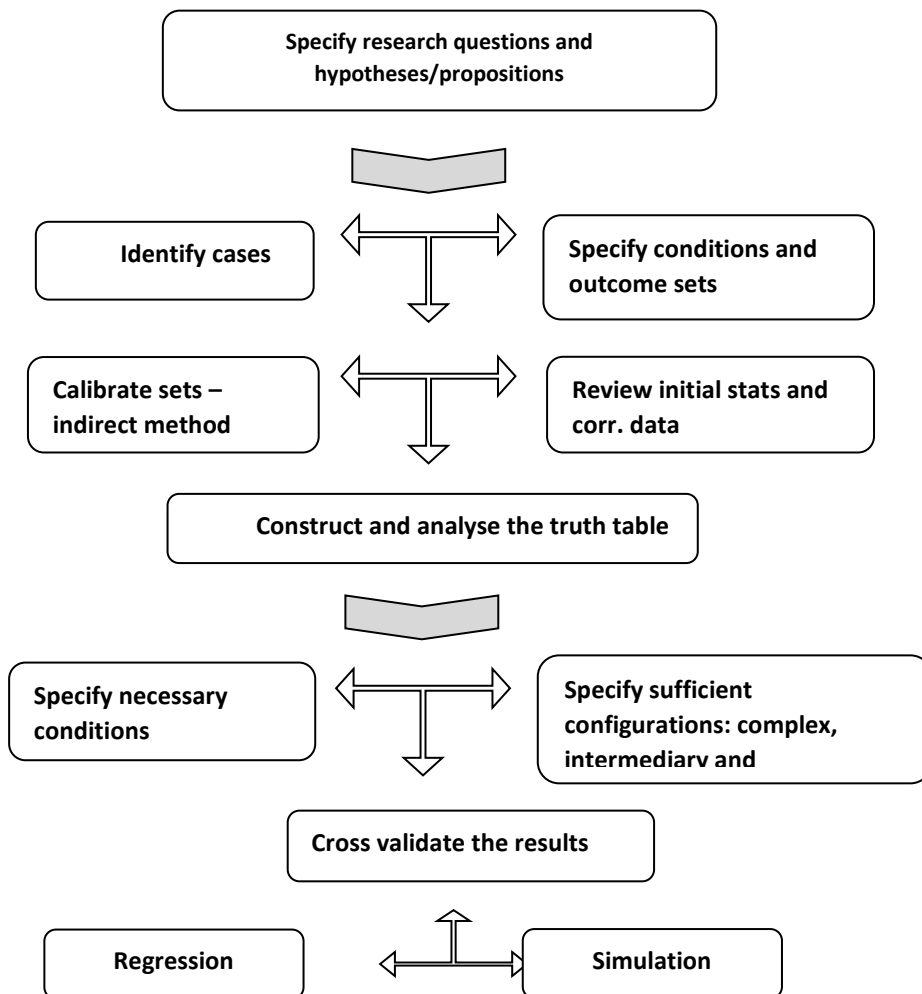| Variables	β	t-values	p-values	Tolerance	VIF	Hypotheses
Classical (C)	- 0.50	- 5.16	0.000	0.46	2.16	H1
Relational (R)	0.27	3.52	0.001	0.73	1.37	H2
Associational (A)	0.29	2.81	0.008	0.41	2.44	H2
C*R	-0.65	-5.90	0.000	0.88	1.14	H1
C*R*A	- 0.24	- 2.10	0.042	0.64	1.56	H1
A*R	0.60	8.89	0.000	0.62	1.54	H2

Table 6: Regression results.

Figure 1: The analysis steps — combining fsQCA and multiple regression/simulation tests (the authors)

Appendices

Appendix 1

Comparison of contract types and clauses

Appendix 2

Interview questions

Appendix 3

Data collection information

Appendix 1

Comparing the differences between contract structures (from review) Sources: Grandori (2006 and 2010); Grandori and Furlotti (2006; 2009a and 2009b)

Contract type	Fundamental principle	Focus of clauses	Type of partnership (suitable for)
Classical Contracts	**safeguard** and **formal control** substantive agreements formal, court-enforceable	**Transaction** Allocate decision rights over task selection and control rights over task execution on predicted circumstances assigned *to one central agent* Highly prescriptive (transactional)	Short, discrete, non-repeatable
Relational Contracts	**Establish a relation** of recognition and respect substantive agreements informal, 'self-enforceable'	**Relationship** Use **informal control** through extra-contractual means to repair some of the failures of classical contracting Transactional	Long-term relations,, moderately uncertain, repeated transactions
Associational Contracts	**Ensure action in contingencies** procedural agreements formal, court-enforceable	**Decision** *Regulate discretion of action, resource lock-in* *Allocate decision-making among multiple parties* Procedural	Long-term relations, highly uncertain, transactions change over time

Comparing contract types and structures

	Associational	Relational
Structure of the contract	A 'core' and a 'belt' 1. **Core**: a constitution of associational clauses 2. **Belt**: a mix of classical and relational clauses, relation- and partner-specific.	Two dimensions: 1. ***intended terms of trade and promised actions*** – written dimension with clauses about the exchange and collaborative/ communication activities 2. ***Extra-contractual mechanisms*** – informal and unwritten dimension to supplement the written contract such as trust, authority or norms.
Clauses	*High-order, content-free, framing* decision rights and resource lock-in	General principles and codes of conduct that should inspire behaviors (good faith, due diligence, non-competition) rules for conflict resolution (negotiation, type of mediation, and arbitration)

More detailed comparison between relational and associational contracts

Explanation of Appendix 1:

A classical contract [named after classical economics or Transaction Cost Economics] establishes the rules for a discrete and simple, short, one-off transaction. Classical contracts safeguard from predicted risks by assigning rights over task selection and control rights over task execution assigned to one central agent (Grandori, 2010: 153). Classical contracts do not take into account the issues of bounded rationality, asymmetric information, or imbalance of power (Kimel, 2007). Eisenberg (2000: 818), proposed that "discrete [another word for classical] contracts are almost non-existent' and "are almost as imaginary as unicorns", suitable for exchanges that "are of very short duration and entailed little in the way of a relationship".

A relational contract "establishes a relation of recognition and respect" among partners (Markovits, 2004: 1417) and includes clauses to support the relationship but also complements the clauses with extra-contract means (e.g., trust, authority or norms Eisenberg (2000: 818)). The explicit clauses in the contract are just an outline; it is the implicit norms that determine the behavior of and exchange between the parties (Kimel, 2007: 236).

In order to coordinate action under uncertainty, associational contracts set a constitutional frame that defines decision rights and procedures and lock in resources for decision-making. A set of high-order, content-free, framing clauses functions as the constitution that governs the process of adjusting the transaction terms over time (Grandori, 2010: 359; Grandori and Furlotti, 2009: 86). This is a shift from the clauses pertaining to actions and behavior in transactional (classical and relational) contracts. Associational contracts are "the opposites of transactional (classical and relational) contracts (Grandori, 2005), as they are procedural and establish an association rather than regulate an exchange" (Grandori and Furlotti, 2009a: 85).

Appendix 2

Interview questions – Our interviews started with questions focused on the interviewees' backgrounds, before going deeper into the project stories. The table below outlines the key interview questions to which the interviewers responded (the structured part of the semi-structured interviews).

Exemplary key questions	*Prompters / issues discussed*
What were the specifics of the bidding phase?	*This question investigates in more detail the raising capital or bidding phase as experienced by all parties.*
How did you divide the work amongst the contracting partners?	*Coordination between partners*
Please describe the contracting process with the other partners—types of clauses and how they have been used	*Coordinating the contract writing process*
What key issues did you find significant during the contract writing process? Problematic clauses	*Impact on performance in Cost, Time and/or Specification—also other coordination issues*
Which issues were more prominent during the execution phase?	*Impact on performance in Cost, Time and/or Specification—also other coordination issues*
How did you deal with hindrances, obstacles or changes in the pre-bidding contracting and execution phases?	*Overcome problems and the effects of contractual clauses*
How do you think these issues could have been prevented?	*Would this require a different type of clause or contract type?*
How did the agreements provide for communication and collaboration amongst the partners?	*Were there instances in which this was not enough?* ***Clause specific question***
How did the agreements provide for allocation of resources?	*Asking for clauses which helped to coordinate and share responsibilities/resources across partnering organizations*
How did the agreements provide for dealing with changes in plans?	*Understanding flexibility to changes in the relationship; how changes in the relationship are reflected in the contract*
How did the agreement provide for insubordination or lack of participation?	*Discussion of (dis-)incentives for partner behaviors*
What are the current operations and performance outcomes and measures for this project?	*Have there been any changes in these performance measures over the project life cycle? On time measures for bid/contract negotiation and build phase; budget measures for overall project*
Do you think that a different contract would not have had these issues or would you need something different in a contract?	*Which parts of the contract did you view as being the most difficult to deal with (during negotiation, management)? ; What kind of rewrite do you think it would need – none, minor or major?*

'

Appendix 3

Data Collection Table: details about each project, length, type, number of partners, number of interviews, length of interviews, number of interviewers in each interview, interviewee details.

Projects	Performance bundling	Contract length (years)	Contract type and value	Value in millions (€ for 1-18 and remaining in £)	Partners	Partners interviewed	Nu of interviewers in each interview	Nu of interviewees in each interview	Nu of interviews + titles	Total time last
1. E- 1	Concurrent national ICT epidemiology project	8	Relational memorandum of agreement	Funding information not available	3	2	1	1	2 (project manager and public health civil service)	4 hours 2 hours
2. E- 2	Concurrent national ICT epidemiology project	8			3	1	1	1	1 (project manager)	3 hours
3. E- 3	Concurrent national ICT epidemiology project	8			3	1	1	1	1 (project manager)	1,5 hour
4. IST- G	Open Source development	2	PBC CSC - Cost-sharing	3.39	8	2	1	1	2 (project manager and 1 contractor)	2 hours 2 hours
5. IST-O	Nursing informatics and telematics	2	PBC CSC - Cost-sharing € 91.000	0.90	6	1	1	1	1 (medical partner and coordinator)	45 minutes
6. IST -T	Patient Telemonitoring	4	PBC	3.20	9	2	1	1	2 (project coordinator + medical partner)	1,5 hour
7. IST- P	Peripheral Regions Oriented Measure	3	PBC	0.50	5	1	1	1	1 (project coordinator)	1,45 hour
8. IST- M	Multi-Access Telematic Management	4	PBC	2.10	6	1	1	1	1 (project coordinator)	50
9. Eten- A	Feasibility study protocol models, effectiveness and performance for deployment	2	OBC	0.73	4	1	1	1	1 (project manager and technical developer)	Minute
10. Eten -E	European Organ Data Exchange Portal Data Base	2	OBC	3.19	5	2	1	1	2 (project coordinator + medical partner)	1 hour
11. Eten- E	Validate the European market for remote monitoring service	3	OBC	2.13	4	1	1	1	1 (project coordinator)	45 minutes
12. eTEN – M[1]	Medical consultation Assistance for ships	2	OBC	2.73	5	1	1	1	1 (project coordinator)	2 hours

No. / Name	Description		Type						Participants	Duration
13. eTEN –M[2]	Analyze market demand for Home Care in cross-national system	2	OBC	2.63	6	2	1	1	2 (project coordinator+ ICT researcher/developer)	2 hours
14. Eten - I	trans-European network for environmental diseases, Asthma Allergy	3	OBC	1.82	5	2	1	1	2 (project coordinator+ one partner -medial)	1 hour
15. Eten- T	Feasibility study, commercial validation and deployment	2	OBC	3.20	6	2	1	1	2 (project coordinator and ICT developer)	1 hour
16. eTEN – M[3]	Medical Diagnosis, Communications for monitor own asthma patients	2	OBC,	3.67	5	2	1	1	2 (project coordinator + one supplier)	50 minutes
17. Eten-N	Develop network of Telemedicine providers and services	3	OBC	3.00	5	2	1	1	2 (project coordinator + one practitioner supplier)	2 hours
18. Hospital A	Design, build, finance and operate (DBFO); construction of new hospital; hard and soft service FM	30	Classical - Non-standard	150	2	2	2	1	28 (various, project managers, administrators and supply partners)	40.8h
19. Hospital B		30	Classical - Standard (version 3)	150	2	2	2	1	14 (various, project managers, administrators and supply partners)	19.7h
20. NGO 1	Providing medical care in a timely fashion, supplies quality, cost efficiency aspects, offering services to more deserving (affected) people using market surveys, inspecting sites and conducting case studies. NGOs provided more front line services, directly dealing with patients and affected people, providing many healthcare services	5	Associational clauses	5	3	1 (NGO)	1	1	1 (project manager)	2 hours
21. NGO-G 2		6	PBC CSC - Cost-sharing	10	4	1 (G)	1	1	1 (operations manager)	1 hour
22. NGO-G 3		8	OBC	3	3	2 (both)	2	2	2 (logistics manager and government officer)	4 hours
23. NGO-G 4		7	PBC CSC - Cost-sharing	15	4	1 (G)	1	1	1 (project director)	2.5 hours
24. NGO-G 5		10	OBC	4	3	1(NGO)	1	1	1 (country director)	1 hour
25. NGO-G 6		6	OBC	4	4	1	1	1	1 (project director)	1.5 hours
26. NGO-G 7		17	PBC CSC - Cost-sharing	12	6	1	1	1	1 (project director)	2 hours
27. NGO-G 8		8	Relational memorandum of agreement	2	4	1	1	1	1 (operations manager)	1 hour
28. NGO-G 9		10	OBC	6	5	1	1	1	1 (logistics manager)	1.2 hour
29. NGO-G 10		20	Relational memorandum of agreement	10	6	2 (both)	2	2	2 (project coordinator)	2.8 hour

30. Supplier-NGO 1	These organizations (private suppliers and NGOs) are involved in joint collaboration with suppliers. Their performance bundles encompass timely deliveries to NGOs, central distribution hubs and local warehouses. Logistics performance indicators (e.g., service quality) between different parts of supply chains, quality of product and cost efficiency were main performance measures	6	PBC CSC - Cost-sharing	15	7	1 (S)	1	1	1 (director, owner)	1 hour
31. Supplier-NGO 2		5	OBC	5	3	1 (NGO)	1	1	1(project director)	1.10 hour
32. Supplier-NGO 3		11	PBC CSC - Cost-sharing	18	4	1 (S)	1	1	1 (supply chain manager)	1 hour
33. Supplier-NGO 4		13	OBC	7	3	1 (S)	1	1	1 (Logistics and distribution manager)	1.4 hour
34. Supplier-NGO 5		12	PBC CSC - Cost-sharing	9	4	1 (S)	1	1	1 (director)	1 hour
35. Supplier-NGO 6		18	Relational memorandum of agreement	4	3	1 (NGO)	1	1	1 (project coordinator)	1 hour
36. Supplier-NGO 7		21	Relational memorandum of agreement	11	5	2 (both)	2	2	2 (country director and government officer)	4.5 hours
37. Supplier-NGO 8		14	Relational memorandum of agreement	10.50	6	1 (NGO)	1	1	1 (country director)	1.9 hours
38. Supplier-NGO 9		13	Relational clauses	8	3	1 (NGO)	1	1	1 (project director)	2 hours
39. Supplier-NGO 10		10	Relational memorandum of agreements	15	4	1 (S)	1	1	1 (director)	2.5 hours
40. Supplier-NGO 11		9	OBC	4	4	1 (S)	1	1	1 (supply chain manager)	1.5 hours
41. Hospital-NGO 1	Hospitals and NGOs work together to provide mass-scale services, including emergency operations and surgeries required for people affected by disasters (e.g., earthquakes). Time, cost, preferences for most affected people, and service quality were the key performance indicators, which were part of their contracts	9	Relational and association memorandum of agreements	15	6	1 (H)	1	1	1 (doctor)	2.2 hours
42. Hospital-NGO 2		6	OBC	2.50	3	1 (H)	1	1	1 (doctor)	2.6 hours
43. Hospital-NGO 3		10	PBC CSC - Cost-sharing	12	5	2 (both)	2	2	2 (doctor and country directory)	5.5 hours
44. Hospital-NGO 4		14	OBC	11	3	1 (NGO)	1	1	1 (project director)	2.9 hours
45. Hospital-NGO 5		8	Relational memorandum of agreement	4.50	3	1 (NGO)	1	1	1 (operations manager)	2.4 hours

Authors:

Maria Kapsali
Lecturer in Management Systems (Projects & Operations)
Management Systems & Logistics
Faculty of Business, Law and Politics
Hull University Business School
M.Kapsali@hull.ac.uk
+0044 (0)1482 34 7598
[in] https://www.linkedin.com/in/mariakapsali/

Maria Kapsali has conducted research for more than 10 years in the management of innovative and creative projects-operations at Manchester Business School (OPTIMA = Operations, Technology and Innovation Management), at Imperial College Business School (Innovation & Entrepreneurship group; HaCIRIC = Health and Care Infrastructure Research and Innovation Centre), at the University of Umeå, Sweden (Project and Innovation Networks group) and at the University of Hull (Management Systems and Logistics group). The results of her work are two books, four published scientific articles, four book chapters and several other contributions. Maria's work is published in Technovation, Systems Research and Behavioral Science, the International Journal of Project Management, the Scandinavian Journal of Management and by Palgrave/Macmillan and Edward Elgar.

Jens Roehrich
HPC Supply Chain Innovation Lab
Information, Decisions and Operations Division
School of Management
University of Bath BA2 7AY
United Kingdom

Jens Roehrich is the HPC Chair in Supply Chain Innovation at the School of Management, University of Bath, UK. Before joining the University of Bath, Jens worked at Imperial College Business School, Imperial College London, UK. Significant strands of his research agenda explore the long-term interplay of contractual and relational exchange governance mechanisms and the management of public-private collaborations in the UK and across Europe. His research has been published in journals such as International Journal of Operations and Production Management, Journal of Management Studies, British Journal of Management, and Social Science & Medicine.

Pervaiz Akhtar
Management Systems & Logistics
Faculty of Business, Law and Politics
Hull University Business School, UK
IESEG School of Management, France
Abasyn University, Pakistan
https://www.linkedin.com/in/pervaiz-akhtar-7175054b/

Pervaiz Akhtar is Full Professor (Chair) of Management Systems and Director of BSc Logistics & SCM at University of Hull, UK. He holds Visiting Professorships in Big Data and Analytics/Management Science, IESEG (France) and Abasyn University (Pakistan). He is a Member of Academic Executive Council and has served as Director for multiple Programmes. Capitalising on over 15 years of academic and industrial experience, his areas of expertise encompass Business Analytics, Data Science, Information Systems, Innovative Research Methods/Techniques, Logistics, Transportation and Operations to Supply Chain Planning and Control. His research has appeared in leading journals. He can be contacted at pervaiz_khan972@hotmail.com.