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## **Subcontractors' business relationships as risk sources in project networks**

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# **Subcontractors' business relationships as risk sources in project networks**

## **Abstract**

This paper addresses the risks for a main contractor firm's project business that arise from subcontractors' inter-organizational relationships in complex and dynamic project networks. Existing project risk management research neglects the management of such relational risks in networks. This paper discusses this un-researched area by analyzing triads representing sub-networks of three actors in a larger network. The empirical study employed several semi structured interviews in two global contractor organizations. Critical incidents identified in triadic settings were used to explain the logic of how risks arose from subcontractors' inter-organizational relationships. This paper identifies four categories of risk sources characterized by subcontractors' inter-organizational relationships. The four risk source categories are based on subcontractors' relationships with 1) other subcontractors, 2) the contractor's competitor 3) the contractor's client and 4) non-business actors (e.g. a local authority or regulatory body). The empirical study emphasizes the dynamic nature of the risks that business relationships cause in the main contractor's current and future projects and business. Furthermore, the empirical analysis suggests that the risks arising from subcontractors' relationships have an impact on two different layers: a) the temporary project network layer and b) the permanent business network layer. The impacts of risk on the temporary project network layer relate to specific sales and delivery projects, whereas the impacts of risk on the permanent business network layer relate often to changes in the network position of the business players. This paper suggests a novel risk management approach, where risks and opportunities arising from subcontractors' relationships are actively taken into account in subcontractor management.

**Keywords:** project business, project network, business network, business relationship, project risk management, business risk management

## Introduction

Due to the trend of increasing subcontracting and focusing on core competences, organizations and projects are more and more dependent on their suppliers (Ahola et al. 2007). Today's projects can be seen as complex networks of several interdependent actors (Hellgren and Stjernberg 1995, Dubois and Gadde, 2000; Eloranta et al., 2006). From a main contractor's viewpoint, suppliers form one important actor group in project networks. Procurement decisions and subcontractor selection within projects are critical for project success (Holt 1998; Wang et al. 2007). Furthermore, procurement decisions and subcontractor selection in projects does not only influence the success of a single project, but they also influence the long-term success of a project-based firm (Walker et al., 2008).

Subcontractors in project networks do not exist in isolation, but each subcontractor has a number of relationships with other project network actors. Even though there is extant literature on risk management processes within projects available (see for example Chapman and Ward, 2002, 2003; Ward and Chapman, 2003), the research focus in existing studies does not address risks arising from inter-organizational relationships of organizations involved in project networks. Instead, the focus in existing risk management and subcontracting models is limited to analyzing individual subcontractor's capability and such risks that the subcontractor itself may directly cause to the project in a dyadic buyer-seller setting.

It is not until recently that the research on projects has expanded to the relationships between firms, by raising the issue of inter-firm projects (Söderlund, 2004). Relationships with other network actors have in previous literature been argued to introduce secondary, indirect or network function of relationships effects (Håkansson and Snehota, 1995; Möller and Törrönen, 2003; Ritter 2000). As each subcontractor is linked to many other business actors through a network of business relationships, it is obvious that inter-organizational relationships between organizations serve as sources of risks for projects and for the main contractor firm's project business.

In this paper, the research focus is on the risks that a subcontractors' inter-organizational relationships pose for a main contractor that serves as a major orchestrator of a project network and its subcontractors. The main contractor is expected to create business benefits for its customers by effectively using the subcontractor network as a major resource. In this setting, both single project activities and longer-term business activities with customers (across past and future projects) are important. The research question of this study is:

*What kind of risks arise from subcontractors' inter-organizational relationships in project networks?*

Here, subcontractors' inter-organizational relationships are understood as any type of meaningful relationships that subcontractors have to another organization in the project network. All such relationships can be considered as potential risk sources for the project

contractor. The purpose of this paper is to introduce a need for a new kind of risk management. This way, the paper contributes to project risk management discussion, but from a different perspective than what the existing project risk management literature does.

The research strategy and methodology in the paper is the following. In the literature study, we first acknowledge the research gap in the existing project risk management research. Then, the researched phenomenon with specific emphasis on networks, relationships and subcontracting is approached through a literature analysis by using literature on project and business networks, inter-organizational relationships, purchasing, and project risks. The empirical study is conducted with two project contractor firms: a telecom system contractor and an automation system contractor. The method of the empirical study is based on identifying different triadic settings of three actors where each triad represents a sub-network of a larger project or business network. The triadic setting is used to analyze the business relationships of a subcontractor as a risk source that would affect the contractor's projects and business. The data gathering is conducted in interviews with managers. The empirical study identifies critical incidents that are used to analyze the logic of how risks arise from subcontractors' inter-organizational relationships. The critical triadic incidents form the empirical understanding of the research theme. Finally, the empirical study identifies critical network effects as new relationship-related types of risks that are not discussed in the existing project risk management or subcontracting literatures.

### *Existing research on project risk management*

In project risk management literature, risk is defined as the possibility that events, their resulting impacts and dynamic interactions may turn out differently than anticipated (Ward and Chapman, 2003; Miller and Lessard, 2001). Accordingly, in this paper we consider that the concept of risk can include the possibility of both favorable and unfavorable outcomes, but in the case of a risk with an emphasis on mostly favorable outcomes, we may replace the term risk with the term opportunity (see e.g. Chapman and Ward, 2002, 2003). The extant literature on project risks and their management over recent decades recognizes the importance of other actors in the project as important sources of risk (Kharbanda and Stallworthy, 1983; Artto, 1986; Kharbanda and Pinto, 1996; Pinto, 1997; Flyvbjerg et al., 2003; Klemetti, 2006). Morris and Hough (1987) discuss the risk theme through the concepts of project success and failure, by referring to several empirical studies on the subject. Furthermore, one research line in the literature on risk in projects puts a specific emphasis on risks rising from a dyadic setting between two actors (Hartman and Snelgrove, 1996; Zaghloul and Hartman, 2003; Williams et al., 2003). This research line tends to emphasize contractual settings, problems, collaboration and trust between two actors in a project. Even though risks and risk management are discussed widely in contractor-subcontractor settings especially in the construction project risk management context (Dubois and Gadde 2001, Mills 2001, Baloi and Price 2003, Cohen and Palmer 2004), the focus of subcontractor risk considerations has remained mostly at the level of evaluating an individual subcontractor's capability and

characteristics in a dyadic setting, and discussing respective implications to the buying contractor firm and its project. To date, risk management studies have had a tendency to focus on direct operational issues within a single project. Miller and Lessard (2001) introduce the social and institutional risks as one type of risk that relates to the project environment and its actors. Even when existing risk management studies refer to relationship-related risks, they tend to limit the discussion to rather straightforward operational issues in a dyadic setting between two actors in a project. Therefore, we argue that the current risk management literature ignores inter-organizational relationships between different organizational entities which would go beyond the dyadic setting between two actors and introduce risks of different nature through complexity and dynamism in the whole network of project actors. Furthermore, the more long-term strategic viewpoint of looking at the business relationships between actors beyond single projects is lacking in the current risk management research.

### *Project networks and business networks as a complex context for relationship-originated risks*

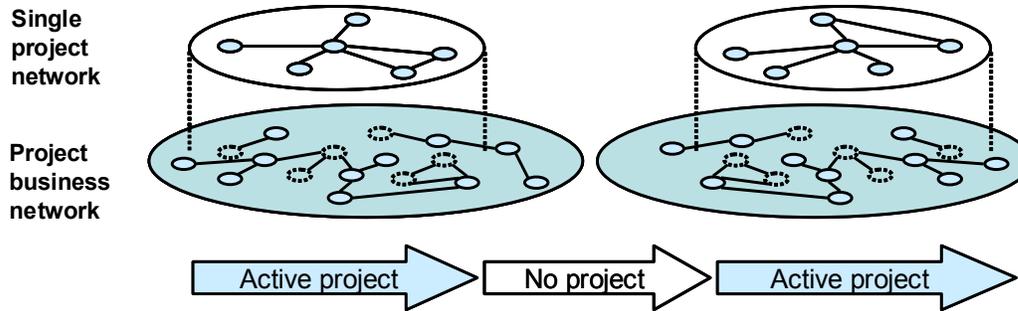
During recent years, project studies addressing the relationships between firms has increased considerably (e.g. for inter-firm projects, see Söderlund, 2004). The 'project business' definition by Artto and Wikström (2005) emphasizes the business network aspect by referring to business of 'several firms': "Project business is the part of business that relates directly or indirectly to projects, with a purpose to achieve objectives of a firm or several firms." Project contractor firms are engaged into a specific type of project business where customer delivery projects are in the firms' production lines (Artto et al., 1998). With regard to theoretical implications, to date only a few longitudinal and contextual studies have been conducted of individual projects (e.g. Welch et al., 1996) or of the long-term development of relationships related to project business (e.g. Ahmed, 1993; Skaates et al., 2001). Furthermore, there is still a lack of general understanding of networks' dynamics and processes, i.e. how networks and relationships function in various situations of discontinuous, complex and differentiated project business.

Projects are temporary networks consisting of several organizations or actors (Dubois and Gadde, 2000; Eccles, 1981). The network aspect emphasized that no actor alone has a total control over the network (Powell, 1990). The temporary nature of project networks mean that they exist in that specific form only during the time-line of a single project. As stated by Hellgren and Stjernberg (1995), studies of collaborative arrangements and networks usually concern long-term inter-organizational arrangements, such as acquisitions and joint ventures. There is a growing body of literature concerned with describing, understanding and evaluating the inter-organizational relationships of actors highlighting the interconnectedness of relationships (Håkansson and Snehota, 1995). Recently, this approach has gained momentum especially in project marketing research with the emphasis on Industrial Network Approach (see e.g. Cova et al., 2002; Cova and Salle, 2005). Industrial Network Approach addresses an actors' relational position, mutual interrelationships of all parties of the network, and the importance and benefits of its inter-organizational relationships. However, even though interrelationships have been

a new area of interest, not least due to the increased trend of outsourcing and the increased role of turnkey deliveries, there has been very little discussion on the functioning and dynamics of project networks outside the field of project marketing.

Project networks can be seen as instruments of achieving specific, pre-defined targets. At a casual glance it may appear that these mutual pre-defined targets act as the temporary underlying force of gluing the project network actors together (Hellgren and Stjernberg, 1995). Nevertheless, the individual actors involved in the temporary project network might have other rationales and motivations for their participation than only fulfilling the specific short-term project task. The temporary project network is also impacted by long-term business interests and objectives of the actors as organizations involved in one project often also participate in the next (Eccles, 1981; Håkansson et al., 1999; Dubois and Gadde, 2001; Beach et al., 2005). Therefore, for an actor, the participation in the short-term project network can also be a means to reshape the position in the underlying permanent project business network (Hellgren and Stjernberg, 1995). In addition, the roles of the actors might be changing from one project to another, making one's partner company in a project a competitor in the next. A direct consequence of the dynamic interplay between the short-term temporary project network and the underlying permanent (but dynamic and constantly changing) business network is that we cannot always expect the actors of a project network to behave rationally for the purposes of the project at hand, but there are many contradicting and hidden agendas between the actors of the network (Hellgren and Stjernberg, 1995). The objectives of all actors are not always aligned, but the actors can have contradictory and conflicting objectives, which are potential sources of risk.

Figure 1 shows a two-layered picture of project networks and project business network. In the upper layer of the figure, there are two separate networks of two projects that are executed at different points of time. The lower layer of the Figure 1 shows project business network, which is a constellation of actors that are or could be involved in each other's current or future project activities. Between the two active sales and delivery projects there is the 'no project' phase, and accordingly, relationships between actors in the project networks enter into a "sleeping phase" (Hadjikani, 1996, Cova et al. 2002). The sleeping phase has to be managed actively in order to maintain a good relational position for future project deliveries. The maintaining, improving and other ways of managing relationships with potential customers and subcontractors is extremely challenging especially in the sleeping phase when there are no concrete ongoing projects activities between the firms. This relational setting introduces risks and opportunities for a project contractor firm.



**Figure 1:** *Two interrelated layers: single project network and project business network*

The project business network combines the past, present and future into a network of business actors that are, or could potentially be, involved in mutual business activities in current or future projects (Figure 1). Due to its permanent and only slowly shifting business context-like setting with vague and adversarial relationships and conflicting interests, a project business network is not as dense as the temporary project network. The project business network does not have such an intentionally constructed core as the project network of a single project does, but there may be intentional partnerships between the actors. The actors of a project business network are either loosely or tightly connected to the network. The actors either have an impact or there is a potential that they could have an impact on the business of delivering projects by some other actors of the network. The actor of a project business network can often itself influence how loose or tight its relationships and connections to certain specific other actors in the project business network are: there are several ways for any actor to develop relationships to other business actors in the network. The actors of the project business network can have collaboration with synergistic aims, or it can be the case that the aims between the actors in the project business network are contradictory and conflicting, which implies adversarial relationships, competition or rivalry.

Basing on the previous discussion, it is of utmost importance that while considering inter-organizational relationships between project network actors, we go beyond single projects to their inter-organizational business relationships. Actors' relationship positions in the overall business network affect the risks arising at the level of single projects. Furthermore, on the other way round, relationships at the level of single projects affect the risks arising at the business level above projects, which has implications on long-term business performance with a portfolio of current and future projects.

### *Subcontractors' inter-organizational relationships as a source of risk for the contractor*

In the purchasing literature, subcontractor risk assessment from the viewpoint of a contractor is intertwined mostly with the actual subcontractor selection process and subcontractor capability evaluation. Mainly the discussion in terms of subcontractor risks within projects relates to procurement risks, which are typically categorized to technical, quality, schedule, delivery and cost performance of subcontractor (e.g. Fleming, 2003;

Hallikas et al., 2004; Miller and Lessard, 2001; Sadgrove, 1996; Treleven and Schweikhart, 1988). Risk assessment related to project subcontractors is mainly concentrating on an individual subcontractor's capability and almost completely ignoring the relationship aspects and the impacts of the actual relationships.

Research on inter-organizational relationships has provided many kind of typologies and categorizations. There is abundance of papers discussing the vertical dyadic inter-organizational relationships between buying companies and subcontractors i.e. buyer-subcontractor relationships (e.g. Ellram and Hendrick, 1995; Holm et al., 1999). Especially, the need for stronger buyer-subcontractor communication and inter-organizational coordination enabling performance advantages has been coloring the recent academic discussion spiced with examples of Japanese firms and keiretsus (e.g. Dyer and Nobeoka, 2000). Therefore, the cases of subcontractor partnering are studied mostly in industries with repetitive production. In essence, the classical dichotomy of TCE (Transaction Cost Economics) view structures exchange relationships along a continuum of vertical interaction, with markets on the one end and hierarchies on the other end (Williamson, 1975). At the extreme pole are the hierarchical forms, where there is the completely vertically integrated firm, where all activities from sourcing raw materials up to the sale are coordinated by a single company. Spot market, on the other hand is described as discrete exchanges wherein the identity of parties, the time dimension and the product characteristics do not actually matter (Williamson, 1975).

The newer forms of relationships such as co-operative subcontractor relationships and buyer-seller partnerships are often acknowledged as hybrid forms of the hierarchy-market dimension (Spina and Zotteri, 2000). An archetypal categorization in terms of supply chain management is to divide the relationships into transactional-type relationships and partnership-type relationships (Lee, 2001), the former based on contracts and rules and the latter involving risks and benefits sharing. Accordingly, the transactional type of relationship can be characterized as arms-length, competitive type of relationship and the latter as collaborative, embedded and cooperative relationship (Uzzi, 1996).

In an ideal-type atomistic market self-interest drives action, dependence is low and actors might constantly switch to new buyers, and sellers exchange partners. Exchange therefore bases on price information distilling the information needed to make efficient decisions, and the relationships are typically linked by arm's-length ties. Collaborative relationships, on the other hand, are characterized by open information sharing and social embeddedness (Granovetter, 1992; Uzzi, 1997). Furthermore, these types of relationships have often been characterized by trust, impersonal ties, joint problem solving mechanisms and mutual commitment rather than by explicit contracts. This is considered to make expectations more predictable and reduce the monitoring costs of other parties' actions (Uzzi, 1997). The picture is often, however, not this straightforward, as there is often both competition and co-operation involved. Brandenburger and Nalebuff (1996) have referred to this type of relationship as co-opetitive relationships, which are of essence especially in project-based environments where a supply partner in one project might be a competitor in the next.

## **Empirical study**

### *Empirical study with two project contractor firms*

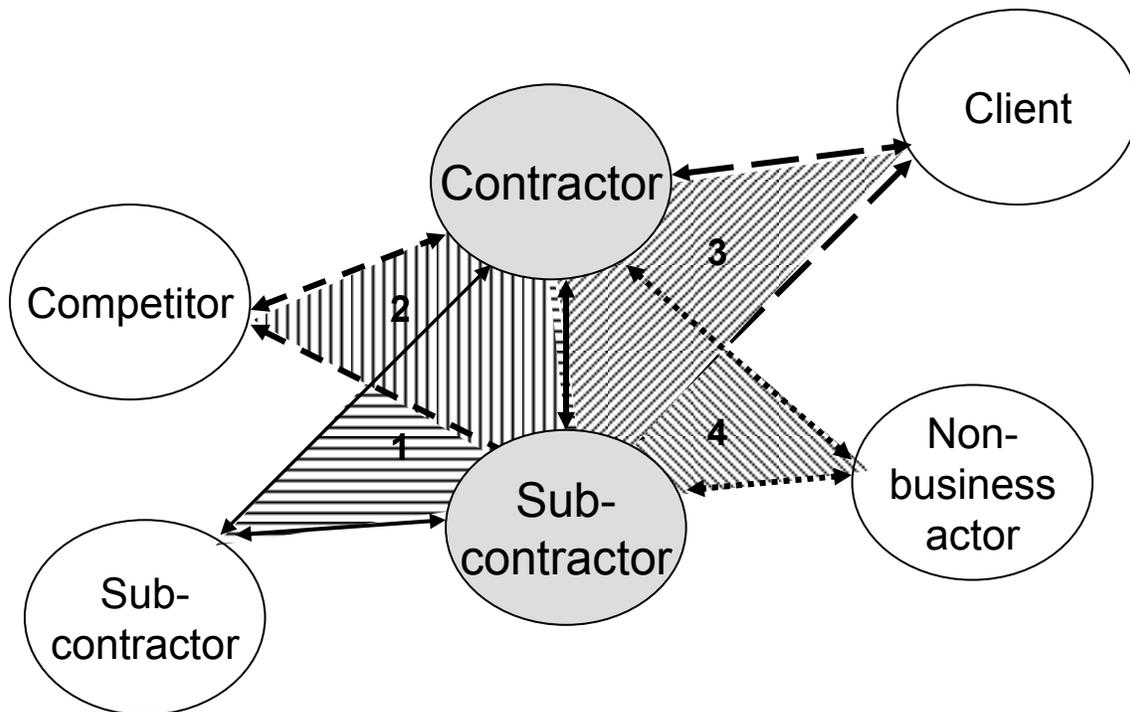
The empirical study is conducted with two project contractor firms: a telecom system contractor and an automation system contractor. Both contractor firms are globally operating contractors delivering complex systems and acting in the central role of a main contractor in various projects. The purpose of the empirical study is to identify subcontractors' inter-organizational relationships that are meaningful for the contractor and serve as relevant risk sources.

As project risk management includes not only reducing the consequences of adverse events but also increasing the positive outcomes from favorable events, we identify in our empirical study, business relationships that have both unfavorable and favorable impacts on contractor's projects and business. Thus, concerning the terminology of our empirical study, where necessary, we use the term 'opportunity' to refer to a 'risk' with a consequence of specific favorable nature.

### *Triad as a methodological tool for the empirical study*

We used the concept of triad as a methodological tool to analyze subcontractors' inter-organizational relationships and the risks that arise from them. A single business relationship exists both in itself and at the same time it is embedded in a context through its connections to other relationships (Granovetter, 1992). Van de Ven and Ferry (1980) suggest that a larger network system can be studied by first examining the network by collecting the data systematically from the smallest unit, which is the pairwise relationship. Then, they suggest that dyadic relations can be grouped to permit an evaluation of the total cluster of pairwise relations between the organizations. The whole system could then be diagraphically represented as a network of the inter-unit system with e.g. communication flows between the organizations. A triad is a network constellation of three actors. Therefore, a triad represents the smallest entity that can be considered as a network – or smallest subnetwork of a larger network. In a triad of three companies, all relationships connecting each two actors affect each other. The effects of a relationship on other relationships are often referred to secondary, indirect or network functions of relationships as proposed by Möller and Törrönen (2003). Traditionally triads have been examined in the context of two or three connected relationships (Blankenburg, 1992; Havila, 1996; and Ritter, 2000). Recent studies in the field of supply chain management have expanded the dyadic buyer-subcontractor approach to a triadic context of buyer and two subcontractors (Wu and Choi, 2005). Yet, some critique has been presented in the undiscerning use of the concept of triad (Holmen and Pedersen, 2000). The critical arguments state that in these studies, the triad is mainly defined by three actors and two or three relationships – and not by three actors and three relationships, which would be in line with the conceptualisations of triads (Holmen and Pedersen, 2000).

Van de Ven and Ferry (1980) suggest that dyadic relationships between each two network actors can be evaluated by measuring and assessing work flows and information flows between the two actors. In project networks the actors are often connected to each other due to e.g. interdependent reciprocal tasks or existing business relationships in previous projects. Figure 2 shows four different types of triads with a subcontractor's meaningful relationship to a third party that our empirical study suggested treating a risk source in a business setting between contractor and subcontractor. The four triads are: 1) contractor-subcontractor-subcontractor, 2) contractor-subcontractor-competitor, 3) contractor-subcontractor-client, and 4) contractor-subcontractor-non business actor. In the empirical study, we report findings concerning each of the four triads.



**Figure 2:** *Four types of triads based on the subcontractor's relationship with a third actor in a contractor-subcontractor business setting*

### ***Research approach and empirical data gathering***

The empirical study adopts an inductive approach, as the previous research is scarce on how a subcontractor's business relationships with third parties may influence the contractor's project business. The applied research strategy was a multiple case study strategy (Yin, 1994), in which triads serve as entities that represent cases. The data was collected in altogether eleven semi-structured interviews in two project contractor firms. The duration of one interview varied between one to three hours. All of the interviewees were experienced managers who had been responsible for managing and developing subcontractor selection and relationships. The interviews were focused around the theme on how subcontractors' inter-organizational relationships are taken into account in project

risk management and what kind of implications these relationships have for the contractor. Furthermore, more in-depth information about how subcontractors' business relationships influence contractor's projects and business was gained by further focusing on realized *critical triadic incidents* that were identified and analyzed by the interviewees. The critical triadic incident approach is based on the critical event approach suggested by Miles and Huberman (1994). By focusing on triadic incidents, the empirical study aimed to discover different risks, their sources and their nature, by analyzing how the risks arose from subcontractors' relationships. In our empirical study, a critical incident can be defined as "a triadic event that poses risks for the contractor". Concerning the validity of the results, one important limitation with the results is that the relative importance of critical triadic incidents cannot be objectively determined (Stauss and Weinlich, 1997). This is because different individuals consider and interpret different events as critical. Some of the triadic settings and risks observed in this study could be considered as typical within the researched contexts, but with such inductive research approach and related data collection methods used, we did not have an opportunity to ensure high saturation in the data. In order to achieve saturation for even better validity of the results in the future, further research would be needed that would more systematically collect leaner data with even more formal instruments derived from the results of this study. For improving the validity of the results of this study, the data was complemented with existing documents and workshops with several experienced project business managers and employees participating in each workshop. The workshops served as group interview forums for the research, but the actual rationale for the firms was to have the workshop for developing company management practices. These workshops operated as an important complementary information source: more in-depth context data could be attained, as the workshop participants reviewed events in the project lifecycle and relationship development of their projects through critical incidents.

## **Results from the empirical study**

As a result of the data collection, by identifying and analyzing triadic incidents, we recognized that each incident seemed to relate to the contractor, a subcontractor and the subcontractor's relationship to one of the following four different actors: another subcontractor, contractor's competitor, contractor's client, and non-business actor. Based on these results, we formed the four different types of triads that were introduced already earlier in Figure 2. Furthermore, by identifying and analyzing triadic incidents, we identified several ways how subcontractors' business relationships served as risk sources and caused either short-term operational project performance related risks or long-term business performance related risks for the contractor. Table 1 reports risks (and opportunities) suggested by the empirical data on critical incidents. The content of the table reflects the empirical data by explaining the logics of risk sources and impacts. Furthermore, the rich empirical data is reflected also later in this paper in the managerial implications section, which discusses in more detail relevant insights acquired from the empirical study.

**Table 1:** *Subcontractor’s business relationships as risk sources as suggested by the empirical study, and respective impacts of risks on the contractor’s project and business performance*

<i>Triadic setting</i>	<b><i>Impact of subcontractor’s relationship on contractor’s project performance</i></b>	<b><i>Impact of subcontractor’s relationship on contractor’s business performance</i></b>
<i>Contractor-subcontractor-subcontractor</i>	<p>Competition between two subcontractors decreases project performance since subcontractors refuse to co-operate or even concentrate on hindering each other’s activities in the project.</p> <p>Subcontractors’ weak or adversarial or competitive relationships with other subcontractors introduce operational performance risks for the project.</p> <p>Subcontractors’ strong and established horizontal relationships support efficient performance in tasks, which are interdependent: adaptation and learning among subcontractors bring operational opportunities that improve project performance.</p>	<p>Two subcontractors form coalition and share tendering information, which reduces contractor’s bargaining power.</p> <p>Subcontractor-subcontractor coalitions from one project to another increase subcontractors’ power and weaken the contractor’s cost efficiency in future projects.</p>
<i>Contractor-subcontractor-competitor</i>	<p>Subcontractor’s intension to deliver also to the contractor’s competitor because of the same customer’s investment project decreases project performance due to subcontractor’s insufficient resources in project execution.</p> <p>Intra-network competition in the client’s investment scheme causes delivery problems in the case of resource constraints, especially when the subcontractor prioritizes delivering to a competitor in the same network.</p>	<p>Subcontractor’s co-operation with the contractor’s competitor in competitive tendering weakens the contractor’s network position with the client(s) and the competitor.</p> <p>Subcontractor’s business relationship with a competitor causes a risk that the contractor’s know-how is transferred to the competitor to benefit the competitor’s business, but simultaneously the relationship introduces an opportunity for the contractor to acquire competitor know-how that improves the contractor’s business performance.</p> <p>Subcontractor’s business relationship with a competitor</p>

<p><i>Contractor-subcontractor-client</i></p>	<p>Client forces the contractor to select or favor certain subcontractor, and this subcontractor's close relationship with the customer enables the subcontractor to build a direct communication and control link with the client and simultaneously keep away from contractor's direct control, which decreases contractor's power to control project execution and lowers project performance.</p> <p>Subcontractor-client relationship causes operational problems in the project execution phase due to subcontractors direct communication channels to the client, which distorts the contractor's control information. A subcontractor can also utilize its good relationship with the client as a source of power.</p>	<p>supports the subcontractor's learning through increased versatile business experience, and this way enhances the subcontractor's capability to support the contractor's business better. This is an opportunity.</p> <p>Subcontractor's relationship with the client helps the subcontractor to by-pass the contractor in tendering and sell directly to the client, and even to start to compete with the contractor.</p> <p>A subcontractor uses a project as an enabler to build a direct business connection to a client, with an intention of by-passing the contractor in the following projects or service agreements.</p> <p>Subcontractor-client relationship serves as a supportive factor in the project marketing phase, as the subcontractor's good relationship with the client and reputation assures the client that the contractor's project will be well-resourced.</p>
<p><b><i>Contractor-subcontractor-non business actor</i></b></p>	<p>Subcontractor's contacts with local authorities help to increase the credibility of the contractor in tendering, and also to avoid unnecessary problems with authorities and regulators in the execution and execute the project with the localized relationship more efficiently. This is an opportunity.</p> <p>Subcontractor's relationships with local non-business actors may support the execution of a project for example in the process of acquiring local permits and approvals.</p>	<p>Subcontractor's adversial relationships with a non-business actor harm also contractor's good relationship with the non-business actor, which poses a possibility that the contractor may lose its reputation as a trusted actor in the market.</p> <p>Subcontractor's good relationships with local authorities may be utilized in forthcoming projects. This means that the subcontractor acts as a bridge between the contractor and local authorities. This is an opportunity.</p>

Distinguishing the ‘project performance’ and ‘business performance’ related risk impacts in different columns in Table 1 emphasizes the different nature of risks and different logic of how risks and their consequences arise. Project performance related risk impacts are effective on the single project network layer, whereas the business performance related impacts can be identified on the project business layer (see Figure 1 for project and business level layers). These two network layers are interrelated. Thus, in order to get a holistic view of the effects of subcontractors’ inter-organizational relationships, the relationships and risk impacts have to be analyzed in the context of both network layers.

Risks with project performance impacts relate to the functioning of temporary project networks that enable successful project sales and delivery process. Risks with business performance impacts relate to the structure and to the functioning of the long-term business network, which enables the contractor’s ability to create further business through projects in a profitable manner. These findings are in line with the suggestions made by Hellgren and Stjernberg (1995), who propose that project actors have short-term project related objectives for participating in the network, but at the same time they also actively create further business opportunities by reshaping the underlying business network. Depending on whether such objectives of a subcontractor are in line with the contractor’s objectives, the subcontractor’s inter-organizational relationships can introduce either favourable or unfavourable impacts for the contractor’s project or business.

## **Discussion and further research**

In existing research, the focus of subcontractor risk considerations has remained mostly at the level of evaluating an individual subcontractor’s capability. Such considerations ignore the risks and opportunities arising from subcontractors’ current and potential inter-organizational relationships in the temporary and underlying project business networks. This study addresses the risks prevalent in inter-organizational relationships by identifying effects that project subcontractors’ inter-firm relationships have on a contractor. Existing project risk management literature neglects risks that relate to these kinds of relational effects in complex and dynamic project networks in a project business context.

This way, our study also paves the way for a new kind of risk management with a new theoretical basis. This study provides foundations for theory building of novel risk management, by selecting to address the risk management theme by using the literatures on project and business networks, inter-organizational relationships, purchasing, and project risks.

An important foundational observation of the paper is that single projects are not isolated entities, but their risks are introduced and influenced by the long-term business network and its inherent relationships. In existing project risk literature, the long-term business network and related business relationships are too often ignored as issues that would not belong to considerations of single projects. Indeed, the recognition of two different but interrelated network layers in this paper are relevant. Business relationships introduce

risks to both the temporary project network layer and the permanent business network layer, but the risks and their impacts are continuously embedded to both layers in an inseparable way.

### *Managerial implications*

The managerial implications of the study are versatile. Managers need to identify, analyze and manage risks as well as potential opportunities, from a more diverse range of sources and contexts (Ritchie and Brindley, 2000; Harland et al., 2003). The empirical analysis recognizes that the effects of subcontractors' inter-firm relationships include both unfavorable risks and favorable opportunities. Further, a clear distinction between risks and opportunities of different nature can be made, as based on their short-term impacts on project performance and long-term impacts on business performance. Therefore, it is of importance for the contractor to systematically and continuously manage both types of relationship risks and not only focus on evaluating an individual subcontractor's capability when selecting a subcontractor for an individual project. The approach suggested in this paper enables a formal and explicit analysis of risks and opportunities rising from project subcontractors' relationships in a networked project. This supports an application of a more proactive risk assessment process that takes a project's dynamic network effects into account.

The identified risks and opportunities bring up issues related to control or co-ordination benefits of subcontractor relationships. A contractor may use their relationship with a subcontractor to control their actions and manage the risks in the project or business network (for discussion about control benefits of inter-organizational relationships see, for example Burt, 1992). On the other hand, inter-organizational relationships may also facilitate joint problem solving and innovation, as the actors utilize fine-grained information that is available through relationships to enable them effectively co-ordinate their inter-organizational practices (Uzzi, 1997; Dubois and Gadde, 2000). In complex tasks, when there exists reciprocal interdependencies between actors, efficient project work may require the co-ordination of activities directly between various actors in the project network without the contractor being in the intermediating role.

The framework of identifying, categorizing and reporting risks in this paper can be employed as a novel risk management approach in subcontractor evaluation and selection. Furthermore, the results of this study can even be used to set new criteria in subcontractor selection. Such criteria could include, for example: the estimated frequency of the exchange, type of exchange, criticality of exchange, history of the relationship, state of the buying company's relationship with the client, subcontractors' relationships to other network actors, state of inter-personal relationships, network positions and power, nature of the network, informal and formal relationships, role stability of network actors, network turbulence, and relationship-specific enablers and barriers. Further studies on subcontractor selection and the impact of subcontractor selection on project and business performance is needed.

In the case of a contractor-subcontractor-subcontractor triad, it is illustrated that the conflicting horizontal relationships between two different subcontractors that have interrelated processes may pose major risks threatening the successful execution of the project. This finding concerns the issues of coordination among different actors in the project network. Thompson (1967) distinguished between pooled, sequential and reciprocal interdependence. Sequential interdependence is “the situation in which direct interdependence can be pinpointed between parts and the order of that interdependence can be specified”. Reciprocal interdependence refers to the “situation in which the outputs of each part become inputs for the others”.

It has been considered highly beneficial to bind a certain subcontractor to the contractor early enough in order to ensure a technically and commercially competitive tender, fine-grained and early knowledge sharing and to signal to the client that capable resources are available. However, as our empirical data shows, trusted suppliers with which mutual adjustment has occurred, may also co-operate with contractor’s competitors during the quotation preparation phase, rendering the contractor’s position in the tender competition. This brings up the issue of control and trust in the contractor-subcontractor relationship. It is likely that the more committed a certain subcontractor is to a contractor, for example the more stable project demand the contractor has offered to the subcontractor, the more unlikely it is for the subcontractor to tender with the competitor, and act as an agent creating intra-network competition.

The triadic case of subcontractor being connected directly to the client might harm the execution of a single project but further pose potential by-pass risks for the contractor. The risk of a subcontractor by-passing the contractor in the next project may also raise conflicting interests within the contractor firm’s organization. This causes the harmful separation and disintegration of the project layer and the business layer even within the contractor’s organization. For example, the project manager of the contractor firm may want to share information extensively and openly with the subcontractor, in order to guarantee the project’s success. However, the business unit manager or key account manager in the contractor firm’s line organization may want to limit extensive information sharing with the subcontractor, in order to prevent the subcontractor from acquiring such information that would help the subcontractor to become a competitor that by-pass them in the next project. The business unit manager or key account manager are more concerned about the success of the project business in the long-term, whereas the project manager’s interest is to ensure the short-term success of the single project at hand.

### *Further research*

This paper suggests a new complementary perspective on an approach for identifying and assessing the risks and opportunities related to subcontractors in project networks. It also expands the perspective on single projects towards a wider perspective where any project is an integral part of the business of the actors participating to the project. As each subcontractor has its own business objectives, risks arising from subcontractors’ inter-organizational relationships for a project contractor in a project can often be related to

different and non-aligned objectives of project network actors at the level of their long-term business interests. The business network setting creates and effects risks inherent in any project, and vice versa, any project creates and effects risks in the business of any actor engaged to the project. This kind of research on risks in networked project business context is scarce. There is also a need for future research on risk management in the context of networked projects and businesses.

From managerial point of view, the risks and opportunities identified in this study are related to the control and co-ordination of subcontractor networks. We suggest that risks and opportunities related to subcontractors' relationships should be actively taken into account in subcontractor management from the controlling perspective. To enable this, there is a need for studies focusing on active subcontractor risk management in projects, which would address the issue of how the contractor can effectively manage its subcontractors by specifically taking into account risks and opportunities arising from subcontractors' relationships with other actors.

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