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CAPABILITIES FOR MANAGING PROJECT ALLIANCES

UNIVERSITY OF OULU GRADUATE SCHOOL,
UNIVERSITY OF OULU,
FACULTY OF TECHNOLOGY



ACTA UNIVERSITATIS OULUENSIS
C Technica 612

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**CAPABILITIES FOR MANAGING
PROJECT ALLIANCES**

Academic dissertation to be presented, with the assent of the Doctoral Training Committee of Technology and Natural Sciences of the University of Oulu, for public defence in the Wetteri auditorium (IT115), Linnanmaa, on 12 May 2017, at 12 noon

UNIVERSITY OF OULU, OULU 2017

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Acta Univ. Oul. C 612, 2017

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ISBN 978-952-62-1539-6 (Paperback)
ISBN 978-952-62-1540-2 (PDF)

ISSN 0355-3213 (Printed)
ISSN 1796-2226 (Online)

Cover Design
Raimo Ahonen

JUVENES PRINT
TAMPERE 2017

Hietajärvi, Anna-Maija, Capabilities for managing project alliances.

University of Oulu Graduate School; University of Oulu, Faculty of Technology

Acta Univ. Oul. C 612, 2017

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Abstract

The infrastructure and construction industry has for decades suffered from problems such as cost overruns, delays, disputes and low productivity. To transform old adversarial practices and industrial culture into more collaborative and innovative ways of working, new operational models for project delivery have been introduced. A project alliance is among the models developed to improve infrastructure and construction project performance by addressing problems of fragmentation and lack of integration. However, the growing body of conceptual and empirical research on project alliances within the field of project management does not include any in-depth investigation of the capability requirements and relevant processes for managing alliance projects. The goal of this dissertation is to contribute to the project alliance literature within the field of project management by exploring the capabilities needed by an inter-organizational alliance project organization and participating organizations to manage project alliances in the infrastructure and construction context.

The research adopts a qualitative approach, utilizing the case study method and in-depth interviews as research methods. The empirical results, which relate to the first project alliances in the Finnish infrastructure and construction industry, highlight the importance of the alliance project organization's collective capabilities for managing project alliances. Among these capabilities, inter-organizational integration management, collaborative project identity formation and opportunity management are of particular importance. In addition, each participating organization requires specific project alliance capability, which comprises both the ability to implement key activities over the project life cycle and the skills required by project-based organizations and participating individuals. Together, these organizational and project network-level capabilities form the basis for managing such projects.

Keywords: alliance project, collaborative project identity, infrastructure, innovation management, inter-organizational integration, opportunity management, organizational capability, organizational identity, project alliance, project alliance capability

Hietajärvi, Anna-Maija, Kyvykkyudet allianssiprojektin hallintaan.

Oulun yliopiston tutkijakoulu; Oulun yliopisto, Teknillinen tiedekunta

Acta Univ. Oul. C 612, 2017

Oulun yliopisto, PL 8000, 90014 Oulun yliopisto

Tiivistelmä

Infrastruktuuri- ja rakennusteollisuus on kärsinyt kustannusten ylityksistä, myöhästymisistä, erimielisyyksistä ja heikosta tuottavuudesta jo kymmenien vuosien ajan. Jotta vanhat, vastakkainasettehuun perustuvat käytännöt ja toimintakulttuuri voitaisiin muuttaa, uusia projektien toteutusmalleja on otettu käyttöön. Projektiallianssi on yksi yhteistoiminnallisista malleista, joka on kehitetty vähentämään toimialan sirpaloitumista ja edistämään integroitumista tavoitteena infrastruktuuri- ja rakennusalan projektien suorituskyvyn parantaminen. Lisääntyvästä konseptuaalisesta ja empiirisestä tutkimuksesta huolimatta, projektiallianssiin kohdistuva tutkimus ei ole tarkastellut organisaatioiden kyvykkyysvaatimuksia ja keskeisimpiä allianssin johtamiseen liittyviä prosesseja riittävän syvällisesti. Väitöskirjan tavoite on edistää projektiallianssin tutkimusta tuottamalla uutta tietoa allianssihankeisiin osallistuvien organisaatioiden kyvykkyysvaatimuksista sekä yhteisistä kyvykkyyksistä, joita projektioorganisaatio tarvitsee allianssiprojektin hallintaan infrastruktuuri- ja rakennusosalalla.

Tutkimus on toteutettu laadullisena tapaus- ja haastattelututkimuksena. Suomen ensimmäisistä infrastruktuuri- ja rakennusalan allianssihankeista saadut empiiriset tulokset korostavat allianssiprojektioorganisaation yhteisten kyvykkyuksien merkitystä. Kyvykkyysvaatimukset kohdistuvat erityisesti organisaatioiden välisen integraation johtamiseen, yhteistyötä korostavan projekti-identiteetin muodostamiseen ja mahdollisuuksien hallintaan allianssiprojektissa. Näiden yhteisten kyvykkyuksien lisäksi jokainen organisaatio tarvitsee projektiallianssikyvykkyuden, joka koostuu allianssihankeiden käynnistämiseen ja hallintaan tarvittavista taidoista ja kyvystä toteuttaa eri elinkaaren vaiheen kannalta keskeisiä toimintoja. Hankkeeseen osallistuvan organisaation projektiallianssikyvykkyys ja yhteiset projektiverkoston kyvykkyudet luovat perustan allianssihankeiden hallinnalle.

Asiasanat: allianssiprojekti, infrastruktuuri, innovaatioiden johtaminen, mahdollisuuksien hallinta, organisaatioiden välinen integraatio, organisaation identiteetti, organisaation kyvykkyys, projekti-identiteetti, projektiallianssi, projektiallianssikyvykkyys

Acknowledgements

I have heard someone saying “the main product of a doctoral process is the person that comes out of it and that the dissertation is only secondary”. Reflecting my journey as a doctoral candidate, this statement holds true. This thesis process was a journey, where I had the opportunity to challenge myself, to push my boundaries and to learn skills that are useful not only in academia but in life in general. I feel grateful that this academic tournament has provided me with new knowledge and abilities that have also opened up new opportunities career wise. I am happy that I had courage to take the step and start this doctoral dissertation process.

There are many people and organizations to whom I own gratitude for supporting and making this journey possible. I would like to express my gratitude to Professor Harri Haapasalo. Although I had several years of experience of doing research before starting the dissertation research, I felt quite nervous at the beginning of this project. Thanks to Harri, I got a quick start for my research and was integrated into relevant organizations that provided data for my work. I thank him for all the support, guidance and encouraging conversations along the journey, and as a bonus, for sharing great tips for running as well. I am deeply grateful to my second supervisor, Assistant Professor Kirsi Aaltonen. Kirsi has taught me the secrets of doing scientific research and given me invaluable support and advice that have made this dissertation happen. I truly appreciate all the enjoyable and intriguing discussions we had during these years.

I am grateful for the valuable and constructive comments and recommendations of the preliminary examiners of this thesis, Emeritus Professor Derek H.T. Walker from RMIT University and Dr. Liisa Jäätvuori from A-Insinöörit. Senior lecturer, Dr. Magnus Hellström from Åbo Akademi University has kindly agreed to act as the opponent in the public defense of this dissertation.

Along this journey, I have received support from many wonderful people I would like to thank. First, I would like to give special thanks for Professor Jaakko Kujala for constructive comments and advice concerning the publications. I am also grateful for my follow-up group members, Professor Pekka Kess, Dr. Kai Hänninen from the University of Oulu and CEO Markku Taskinen from Hartela-Forum, for the practical comments and discussions we had in our follow-up meetings. I would also like to thank all the members of our project business team at Industrial Engineering and Management (IEM) at the University of Oulu for the instructive and motivational sessions we had. Working at IEM was a great pleasure, and I would like to thank the whole working community and friends at the university for

the cheery lunch and coffee breaks. Thanks, you are a great bunch of people. I would also like to thank my prior colleagues from VTT Technical Research Centre of Finland Ltd. with whom I was able to enter the world of research and to start my career as a research scientist.

This research would not have been possible without the support of various organizations. I want to thank the Finnish Funding Agency for Technology and Innovation for its funding for LCIFIN2 research project, which provided the platform for my research and a community of inspiring practitioners. I want to give special thanks also to the Finnish Transport Agency for funding and collaborating in a research and development project “Developing the procurement of infrastructure projects” as part of LCIFIN2 project. Particularly, I am thankful to all the interviewees for generously sharing their experiences on alliance projects. In addition, I am grateful for the direct financial support that Finnish Foundation for Technology Promotion, Tauno Tönning’s Foundation, Confederation of Finnish Construction Industries RT, Jenny and Antti Wihuri Foundation, and Kiinko Real Estate Education provided for my dissertation.

Finally, I want to express my gratitude to all the special people that I have been fortunate to have in my life. I am grateful for my friends who have been a strength for me during this process. Special thanks to my long-term friends for all the gatherings during this process and for the fun and even weird conversations we had about science. I want to thank my parents-in-law and relatives for being so helpful whenever needed. I am truly grateful for my parents Tuula and Jarmo for providing me with the values and foundation that have taken me to this point and for my brother Jesse for encouraging me as a young girl to not to take the easiest way.

Finally, I am truly grateful to my husband Jaakko for his genuine love for me and for reminding me that sometimes too much thinking is too much. And not least of all, thanks for substituting me once in a while as a bedtime story reader for our boys when I have been using my “screen time” as described by our sons, Jere and Riku. Boys, I want to thank you both for adapting to my thesis process and for bringing so much joy into our lives.

Oulu, March 18 2017

Anna-Maija Hietajärvi

Original publications

This dissertation is based on the following publications:

- I Hietajärvi A-M, Aaltonen K & Haapasalo H (2017) Managing integration in infrastructure alliance projects: dynamics of integration mechanisms. *International Journal of Managing Projects in Business* 10(1): 5–31.
- II Hietajärvi A-M & Aaltonen K (2017) The formation of a collaborative project identity in an infrastructure alliance project. *Construction Management and Economics*. In Press.
- III Hietajärvi A-M, Aaltonen K & Haapasalo H (2017) Opportunity management in large projects: A case study of an infrastructure alliance project. *Construction Innovation: Information, Process, Management*. In Press.
- IV Hietajärvi A-M, Aaltonen K & Haapasalo H (2017) What is project alliance capability? *International Journal of Managing Projects in Business* 10(2). In Press.

The author of this dissertation is the first author in all the publications. She had the main responsibility for the research work, gathering and analyzing the research data and writing the publications. The co-authors supported the research work by participating in the designing of the study, gathering data as well as planning, reviewing and commenting the manuscripts.

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1 Introduction

1.1 Background

The infrastructure and construction industry has long suffered from problems such as cost overruns, delays, disputes and low productivity (Pekuri *et al.* 2011, Lahdenperä 2012). Although these difficulties and poor project performance (Lichtig 2006) have been found to arise from the fragmentation and resulting adversarial relationships of traditional “risk transfer” approaches, they continue to undermine current processes in most cases (Chen *et al.* 2012, Lahdenperä 2012). To meet their time, cost, and quality performance goals, owners tend to favor traditional project delivery methods, which entail unbalanced and unclear division of risk between client and contractors (Mesa *et al.* 2016). However, many infrastructure and construction projects fail to meet the owner’s performance expectations (Lichtig 2006), and the industry is characterized by lack of trust and cooperation as well as weak client focus and involvement in the process (Chan *et al.* 2003, Lahdenperä 2012). These same factors are seen to cause inefficiencies such as incapacity for innovation and improvement, time and cost overruns, low productivity and low customer satisfaction (Eriksson 2007).

The problems associated with traditional investment project delivery models and the pressure to develop the construction industry have incentivized organizations to seek new operational models for procuring and delivering projects. Since 1990, a number of initiatives have been launched to address these problems, and new models have emerged for delivering infrastructure and construction projects (Chen *et al.* 2012). A project alliance is among the delivery models developed to improve project performance by addressing fragmentation and lack of integration (Hauck *et al.* 2004, Chen *et al.* 2012, Lahdenperä 2012). As a relational project delivery model, it contractually binds two or more entities to work cooperatively toward agreed outcomes (Davis & Love 2011, Love *et al.* 2011, Jefferies *et al.* 2014, Walker & Lloyd-Walker 2015). A project alliance is generally deployed in large and complex projects, particularly in the infrastructure and construction sector. Inter-organizational projects are executed by a network of diverse firms and organizations—that is, a project network (Artto & Kujala 2008)—and are embedded in networks of inter-organizational relationships (DeFilippi & Sydow 2016). In such project networks, actors usually have varying objectives, interests and expectations from the project, based on the respective

business objectives of their base organizations (Artto & Kujala 2008). For that reason, a high degree of uncertainty is also likely. To successfully initiate and execute an alliance project, the project organization needs the capabilities to collectively manage such a project. This dissertation focuses on the project organization's ability to manage inter-organizational integration, to form a collaborative identity for the project organization and to exploit new ideas and opportunities for the project's benefit.

Planning and implementing integration is one of the core organizational capabilities for dealing with interdependency, uncertainty and change in complex projects (Lawrence & Lorsch 1967, Davies & Mackenzie 2014) such as alliance projects. However, current knowledge of integration management relates to the intra-organizational context, where processes may not require flexible arrangements or the capacity to adapt to changing customer requirements (Okhuysen & Bechky 2009). Equipping project organizations with better capabilities for managing integration will require new theoretical and empirical understanding of integration requirements, the used integration mechanisms and their changes in temporary inter-organizational project designs (e.g. Jones & Lichtenstein 2008).

Designing a specific alliance culture of inter-organizational collaboration (Clegg *et al.* 2002) and establishing a project alliance ambiance (Walker & Lloyd-Walker 2013) are central to the management of alliance projects. In making sense of organizations' actions and social processes that relate to people's interaction and to relationship building and development, organizational identity is considered a core concept (Gioia *et al.* 2013). Many inter-organizational engineering and construction projects struggle with building a sense of joint belonging and a culture of cooperation that integrates the diverse skills, knowledge and expertise of people who have no experience of working together (Bresnen & Marshall 2002, Baiden *et al.* 2006, Bresnen 2009, Laan *et al.* 2011, Ibrahim *et al.* 2013a). As inter-organizational collaboration is pivotal in any project alliance (Huemer *et al.* 2004, Walker & Lloyd-Walker 2015), it is crucial to understand the mechanisms and activities that develop and maintain an alliance organization's collaborative identity (Gioia *et al.* 2013).

A project alliance emphasizes the significance of continuous improvement in all operations, improving performance through better solutions and innovations (Lloyd-Walker *et al.* 2014). Certainly, the uncertainties of complex project work may induce a search for innovative solutions (DeFilippi & Sydow 2016), leading to improved practices that will benefit not only the project but the whole industry.

However, although large and complex projects offer significant possibilities to recognize and exploit these opportunities, research examining concrete practices (Lechler *et al.* 2012, Lehtiranta 2014) that might support continuous and active opportunity management over the project life cycle has to date been limited.

Organizations initiating and managing alliance projects have identified a need for new organizational capabilities for successful alliance project implementation. Some scholars (e.g. Walker & Lloyd-Walker 2011) have also noted that alliance projects demand new knowledge, skills and attitudes from the participating actors. In particular, the organization's capacity to develop and adapt new processes enabling innovation and collective learning have been identified as critical for the success of such projects (Love *et al.* 2015b). To effectively design and implement complex product systems, organizations also need specific project capabilities (Davies & Brady 2000). Yet despite the reported deficiencies, only scant attention has been paid to empirical investigation of the elements that actually contribute to an organization's success in the bidding, managing and operating activities associated with alliance projects—in other words, the elements that constitute an organization's project alliance capability.

While most project alliance research has focused on technical aspects, contractual and commercial set-ups, successful practices and performance implications (Bygballe *et al.* 2010, Love *et al.* 2010, Chen *et al.* 2012, Jefferies *et al.* 2014), considerably less attention has been devoted to empirical study of the organization-specific and project network-level capabilities needed for managing project alliances. Clearly, an improved empirical and theoretical understanding of these capabilities is needed.

1.2 Objectives and scope

Despite a wealth of research on diverse relational project delivery models (e.g. Chen *et al.* 2012, Walker & Lloyd-Walker 2015) as solutions to counter fragmentation and lack of integration, many inter-organizational infrastructure and construction projects fail to meet performance expectations (Lichtig 2006, Lahdenperä 2012). Organizations participating in alliance projects need particular capabilities for bidding, managing and operating successfully in alliance projects, but only limited attention has been paid to exploring the elements that constitute an organization's project alliance capability. As well as overcoming the limited project alliance capabilities of participating organizations, inter-organizational project organizations need better collective abilities to manage project alliances

successfully. In particular, alliance project organizations struggle with integration management (Walker et al. 2002, Lahdenperä 2012), social dimensions of collaboration (Laan et al. 2011, Ibrahim et al. 2013a) and the need to exploit and capture opportunities. To date, however, knowledge of the capabilities needed for managing project alliances remains limited.

The main objective of this research is to *explore the capabilities needed by an inter-organizational alliance project organization and participating organizations to manage project alliances in the infrastructure and construction context*. The dissertation contributes to the project alliance literature within the field of project management by examining project alliance capability requirements for participating organizations and the collective capabilities needed by an alliance organization in managing an alliance project network in the infrastructure and construction industry. The research encompasses four interconnected areas. Three of the original studies—integration management, social process of collaboration and innovation management—were selected because of their significance for alliance project management by a project organization, and as the key collective capabilities needed by an inter-organizational alliance organization for successful project initiation and execution. The fourth original study addresses the capability requirements for organizations participating in alliance projects. The interaction between these four studies is shown in Figure 1.

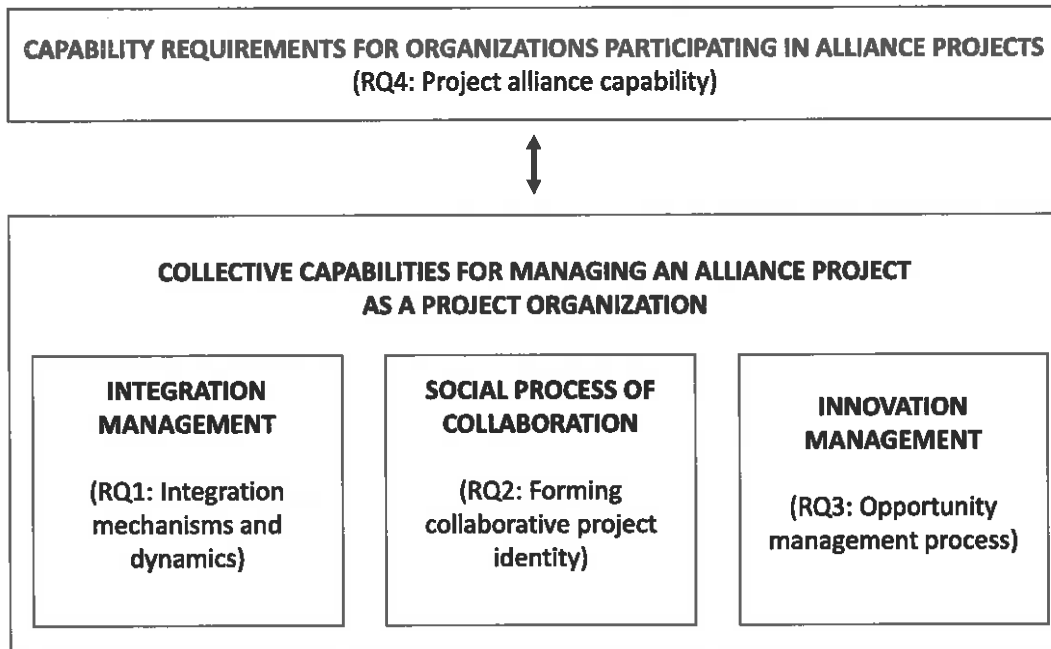


Fig. 1. The research framework.

The present research addresses four research questions (RQs) that relate to the capabilities needed by organizations participating in project alliances, and to relevant aspects of managing an alliance project as a project network (see Table 1). Research questions are induced along the research process; the empirical findings and pre-understanding of project alliances indicated the most salient research themes in relation to organizational capabilities at both organization and project network level. The research questions are situated within the research framework outlined in Figure 1.

Table 1. Research questions.

RQ#	Research question
RQ1	How is inter-organizational integration managed in an alliance project?
RQ2	How can a collaborative project identity be formed in an alliance project?
RQ3	How can an opportunity management process be implemented and enabled over the alliance project's life cycle?
RQ4	What elements constitute an organization's project alliance capability?

The thesis incorporates four separate original studies with dedicated research questions that contribute to the main objective of the present research (Table 2). The first three research questions explore central managerial issues and collective

capability requirements for the project alliance organization, addressing the themes of integration management (reported in publication I), formation of collaborative project identity (publication II), and opportunity management (publication III). The fourth research question plays a synthesizing role, defining project alliance capability as a concept and identifying the capability requirements for participating organizations (publication IV).

Table 2. Research papers overview.

Publication	RQ#	Publication title	Name of the journal
I	1	Managing integration in infrastructure alliance projects: Dynamics of integration mechanisms	International Journal of Managing Projects in Business
II	2	The formation of a collaborative project identity in an infrastructure alliance project	Construction Management and Economics
III	3	Opportunity management in large projects: A case study of an infrastructure alliance project	Construction Innovation: Information, Process, Management
IV	4	What is project alliance capability?	International Journal of Managing Projects in Business

Publication I examines integration management in alliance projects and, in particular, what kinds of integration mechanisms are used and how these are developed and adjusted during two infrastructure alliance projects. Publication II investigates how organizational identity is formed in an alliance project context and, more precisely, on the key activities supporting the formation of collaborative project identity. Publication III presents empirical evidence of a successful opportunity management process based on investigation of an infrastructure alliance project; the paper identifies key opportunity management activities and discusses the enablers of active and continuous opportunity management. Publication IV defines the concept of project alliance capability and identifies the elements constituting an organization's project alliance capability.

1.3 Research approach

The researcher always has his/her own perspective on the research problem or phenomenon, which impacts directly on the available research methods, so affecting the nature of the knowledge produced. The researcher's assumptions relate to the reality that a researcher believes in and how they see the research object (ontology) (Saunders *at el.* 2016), and to how knowledge about that reality can be produced (epistemology) (Guba & Lincoln 1994). Methodology, on the other hand,

concerns how we develop knowledge in practice so that it is valid (Morris 2013). These philosophical concepts inform the research design and strategy, which determine the research direction and how to proceed from research questions to conclusions (Eriksson & Kovalainen 2016). In this study, the adopted ontological view of project alliances is similar to Morris (2013), emphasizing the project’s life cycle from the front-end phase and a broader “management of projects” perspective rather than an implementation-oriented approach. In addition, the study traces the changing nature of projects as they develop over the life cycle. In similar vein, Lloyd-Walker *et al.* (2014) contended that project alliances prompt a relational process-focused ontological view, in contrast to more traditional project approaches, which are dominated by a product-based ontology.

This research leans toward objectivism (see Figure 2), which assumes that the social world exists independently of people and their actions and activities (Eriksson & Kovalainen 2016). An objectivist ontology considers social reality to be external to the researcher who inhabits it (Bryman & Bell 2015). However, in the research theme addressing the formation of collaborative project identity, reality is seen to be based on perceptions and experiences that may differ for each person and may change over time and context (Eriksson & Kovalainen 2016). That reality is constructed through social interaction, in which people create partially shared meanings (Saunders *et al.* 2016). In publication II, then, the ontological view is closer to social constructionism and subjectivism than to objectivism.

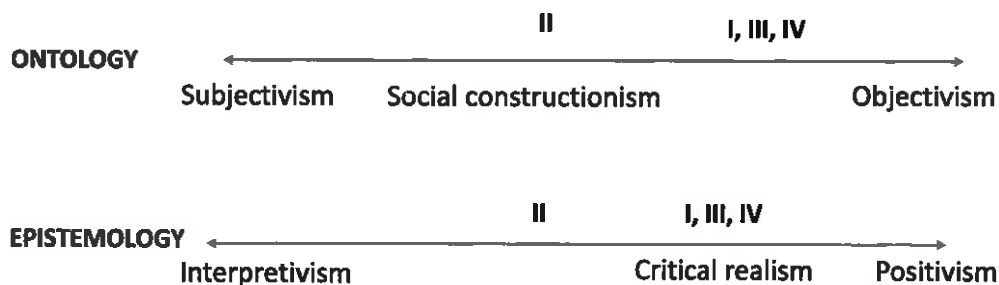


Fig. 2. Ontological and epistemological positioning of publications I-IV.

In dealing with integration management, opportunity management and project alliance capability, critical realism is an appropriate epistemology, viewing reality as material while acknowledging that people may interpret it differently in different times and contexts (Eriksson & Kovalainen 2016), placing an emphasis on contextual conditions (Smyth & Morris 2007). However, in the case of

collaborative project identity, as reality is socially constructed, and knowledge becomes available through social actors (Eriksson & Kovalainen 2016), the relevant epistemology is closer to interpretivism than to critical realism.

While methodology concerns how knowledge about a given issue or problem can be produced (Eriksson & Kovalainen 2016), methods concern the detailed approach and tools used to undertake a particular piece of research (Smyth & Morris 2007)—that is, the specific means of data collection and analysis (Eriksson & Kovalainen 2016). The field of project management relates principally to the social sciences, where the world is not independent of context and value-systems (Morris 2013) and things happen under different environmental conditions. Certainly, projects are context-specific and located in open-systems (Smyth & Morris 2007).

The present research adopts a qualitative and inductive approach. Research is described as inductive when the research process develops from empirical results rather than from theoretical propositions (Eriksson & Kovalainen 2016). This research is mainly explanatory, asking “how” and “why” questions. Inductive analysis of this kind is appropriate when detailed readings of raw data are used to derive concepts, themes or a model through researchers’ interpretations of those raw data (Thomas 2006).

1.4 Research methods and data

The present thesis incorporates four published studies. In the first three of these publications, empirical data collection followed an inductive (single and multiple) case study design (Eisenhardt 1989); in the fourth publication, Lee, Mitchell and Sablynski’s (1999) theory elaboration approach informed the study’s design, and data were collected through depth interviews (see Table 3). Appendix 1 includes detailed information about the interviewees’ background.

Table 3. Research methods and data used in publications.

Publication	Research method	Data collection
I	Multiple case study	Qualitative data from two case projects. Primary data: 17 semi-structured interviews (client, contractor, consultant and engineering agency representatives) and participation in a lessons learned session. Secondary data: project-related documentation.
II	Single case study	Qualitative data from a case project. Primary data: 6 semi-structured interviews (client, contractor, and consultant representatives) and participation in a lessons learned session. Secondary data: project-related documentation.
III	Single case study	Qualitative data from a case project. Primary data: 11 semi-structured interviews (client, contractor, and engineering agency representatives). Secondary data: project-related documentation.
IV	In-depth interviews	Qualitative data from in-depth interviews. Primary data: 23 semi-structured interviews (client, contractor, consultant, and other representatives). Secondary data: project-related documentation, public presentations and research reports.

Publication I is a multiple case study of integration dynamics in two Finnish infrastructure alliance projects: the Liekki and Rantatunneli projects (Table 4). As the research questions address “how” and “why”, the research was designed as an inductive multiple case study (Eisenhardt 1989). The inductive case study approach was selected for two reasons. First, inter-organizational integration mechanisms and their dynamics remain largely unexplored, which supported the selection of inductive case study approach. Second, the research sought to understand *how* the use of integration mechanisms changes over the project life cycle and *why*—in other words, the reasons behind the identified changes. Two case projects were selected on the basis of replication logic. The rationale for selection of these cases was based on the relational project delivery form of both projects; as a project alliance requires and also enables strong inter-organizational integration, significant integration management actions were required in order to balance between integration needs and applied integration mechanisms. In addition, selection of these particular cases was supported by good access to the case data. Primary data were collected by means of semi-structured interviews with relevant actors involved in the Rantatunneli and the Liekki projects. As a complementary data source, the research referred to presentation materials, project plans and a number of public presentations and research reports related to the project. The Liekki case project data also included non-participant observation of the project’s lessons-learned session.

Table 4. Facts about the Liekki and the Rantatunneli projects.

	Liekki project	Rantatunneli project
Content	Railway renovation project	Tunnel construction project
Duration (strategy implementation)	5/2010–2/2015	12/2010–11/2017 (estimate)
Cost (target out-turn cost/ realized cost)	106.4 M€ / 104.8 M€	180 M€ / to be defined
Project organization	Finnish Transport Agency, VR Track Ltd.	City of Tampere, Finnish Transport Agency, Lemminkäinen Infrastructure Ltd., Saanio & Riekkola Ltd., A-Insinöörit Suunnittelu Ltd
Project phase during data collection	Implementation	Implementation

Publications II and III followed an inductive single case study approach (Eisenhardt 1989). A single case study approach was chosen because case studies are considered suitable for exploratory research addressing questions of “how” and “why,” and are especially useful when studying complex processes in their real-life context (Yin 2014). Theoretical knowledge from prior research on organizational identity formation in a permanent organization and opportunity management helped to define opportunity management and identity formation activities in the context of temporary organizing of a novel project delivery form. Because of its status as a pioneering alliance project in the Finnish construction industry, data for publication II were collected from the Liekki project. This offered a fruitful and revealing context in which to study collaborative identity formation activities, as no actor within the Finnish infrastructure and construction sector had any prior experience of project alliancing. Established industries provide a salient environment in which to study organizational identity because nascent institutionalization makes identity formation activities particularly visible (Clegg *et al.* 2007). In publication III, data were collected from the Rantatunneli project, which was the first major alliance project conducted in Finland. As this unique and highly complex project involved a high level of uncertainty, it was a good empirical context in which to study opportunity management practices in inter-organizational projects. In addition, innovation management played a more significant role in the Rantatunneli project than in some other ongoing alliance projects. The unit of analysis in publications I, II and III was the alliance project.

Publication IV drew on existing research on project alliances, project capabilities and general alliance management within the field of strategy research

to conceptualize and define the elements of project alliance capability. Lee, Mitchell and Sablinski's (1999) theory elaboration approach informed the study's design. In theory elaboration, general conceptual or theoretical frameworks (Ketokivi & Choi 2014) are used to approach the empirical context and data. The inductive approach was based on in-depth interviewing; primary data were collected by means of semi-structured interviews with personnel involved in the formation and implementation of alliance projects in the Finnish infrastructure and construction industry (including those from the Liekki and Rantatunneli projects). The unit of analysis was the project-based organization.

In those studies, the evidence was qualitative in nature, with all primary data collected through semi-structured interviews conducted by at least two researchers. These primary data were complemented by project-related documents and reports and by one-day observation in a project's lessons learned event. Up to three researchers conducted the interviews between November 2014 and March 2016. Each interview lasted between one and two hours, yielding 287 pages in total of transcribed material. Altogether, the publications referred to in this thesis drew on 23 interviews. To enhance data quality and reliability, all interviews were recorded and transcribed (Voss *et al.* 2002). Researchers took notes during the interviews in support of the recorded material and to maintain validity. To increase the validity of the data, related archival documents such as presentation materials, project plans and public presentations and research reports were used as a complementary data source. The researchers spent one day observing a particular alliance project's lessons learned workshop to deepen understanding of the factors perceived to affect the success of the project. Interviewees were coded for anonymity and were allowed to check the analysis to prevent any misunderstandings.

The data analysis process started during the data collection phase, when the researchers gained an initial impression of the case and the issue in question. To move beyond initial impressions (Eisenhardt 1989), data analysis followed a structured process. In publications I, II and III, this process began with the creation of case study descriptions of both case projects. The interview transcripts were read by two researchers, and the primary findings for each theme were discussed. The data were subjected to qualitative content analysis and then structured using first-order and second-order categories based on the research theme under investigation. Excel was used for content analysis and coding. In publication IV, the data analysis process followed conceptualization of an organization's project alliance capability, based on pre-understanding from the existing literature. Following

conceptualization, the data were content analyzed in the same way as in the case studies.

2 Literature review

The following literature review provides an overview of the theoretical perspectives and literature streams deployed in this dissertation (Figure 3). The research contributes mainly to the project management literature and in particular to the project alliance strand, which provides the context for this dissertation. In section 2.1, the project alliance literature review describes the delivery model as a concept and prior research conducted in the field (e.g. Ibrahim *et al.* 2015, Walker & Lloyd-Walker 2015). In addition, the different phases of the alliance project life cycle (Lahdenperä 2010) are outlined, along with the issue of project alliance performance (e.g. Walker *et al.* 2013, Wood & Duffield 2009). In addition to the project alliance literature stream, this dissertation also draws on the theoretical knowledge originating from the more general field of project management, with particular reference to the management of large and complex projects (e.g. Artto *et al.* 2008, Morris 2013), uncertainty management (e.g. Brady *et al.* 2012, Lehtiranta 2014), project capabilities (Davies & Brady 2000) and the characteristics of temporary organizations (Bakker 2010).

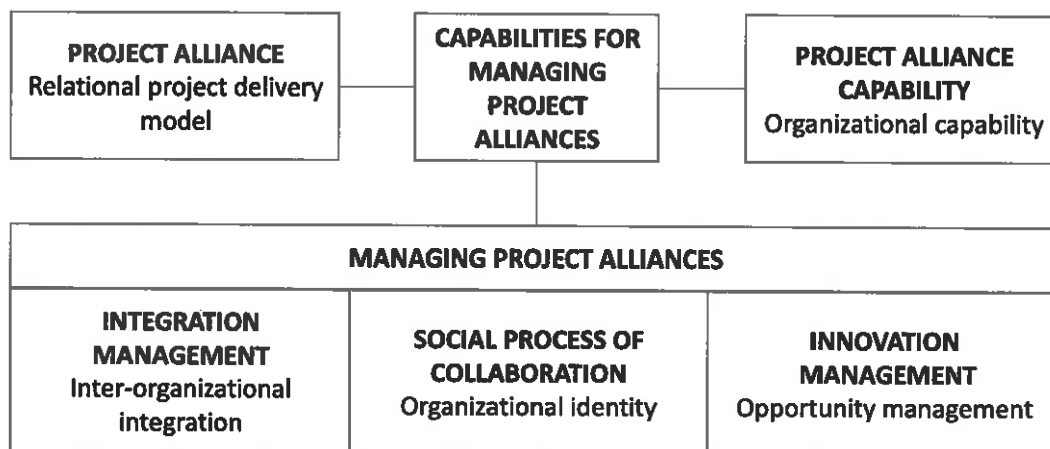


Fig. 3. The literature applied in this dissertation.

As the present research seeks to improve understanding of project alliance capability requirements for participating organizations, and to define the concept of project alliance capability, the literature review serves as an introduction to the project capability literature (Davies & Brady 2000) and the general alliance literature within the field of strategy research (e.g. Schreiner *et al.* 2009, Sluyts *et al.* 2011) deployed in defining the concept (section 2.2). In addition, the capability

requirements identified in the project alliance literature (e.g. Chen & Manley 2014, Jefferies *et al.* 2014, Walker & Lloyd-Walker 2015) are discussed as a basis for defining the elements that constitute an organization's project alliance capability.

Section 2.3 focuses on the key aspects of managing an alliance project as a project network (Arto & Kujala 2008). The themes and theoretical perspectives selected for present purposes relate to integration management (e.g. Turkulainen 2008, Okhuysen & Bechky 2009), the social process of collaboration (Laan *et al.* 2011, Ibrahim *et al.* 2013a) and innovation management (e.g. Davies *et al.* 2014, Walker & Rahmani 2016). The literature review provides an introduction to each of these themes, focusing on the special requirements and characteristics identified in the project alliance literature, beginning with the principles of managing inter-organizational integration (e.g. Van de Ven *et al.* 1976, Turkulainen *et al.* 2015) in a dynamic project context. The social process of collaboration is then discussed, drawing on the concepts of project identity and identity formation (Gioia *et al.* 2013) in a temporary organization (Bakker 2010). Finally, the literature on innovation management in alliance projects (e.g. Manley 2006, Lloyd-Walker *et al.* 2014) is reviewed, with particular reference to opportunity management (e.g. Olsson 2007, Lehtiranta 2014).

While other theoretical perspectives, such as knowledge integration and stakeholder management, might have been selected to increase knowledge about the collective capabilities needed to manage project alliances, the present research focuses on integration management, social process of collaboration and innovation management because of their centrality to empirical research. Other project delivery models excluded from this investigation include partnering (e.g. Kadefors *et al.* 2007, Eriksson 2010), integrated project delivery (e.g. Matthews & Howell 2005, Cohen 2010), and public-private partnership (e.g. Zheng *et al.* 2008, Cruz & Marques 2013). In particular, the present research is concerned to explain what project alliance capability means rather than how that capability might be built (e.g. Brady & Davies 2004, Davis & Walker 2009) in a permanent organization or in a temporary project organization.

2.1 A project alliance—a relational project delivery model

2.1.1 The concept of a project alliance and prior research perspectives

In recent years, project alliances in the infrastructure and construction industry have attracted increasing attention (Lahdenperä 2012, Ibrahim *et al.* 2015, Walker & Lloyd-Walker 2015), and a number of studies, varying in focus and perspective, have examined this procurement and delivery model. Alliances in general emerged in other industries long before project alliances appeared in practice. The first alliances were strategic; in a project-based industry (Artto & Kujala 2008), these can typically extend beyond a specific project and might be defined as inter-organizational arrangements (Peters *et al.* 2001), involving exchange, sharing or co-development of products, technologies or services between firms (Gulati 1998). In the construction industry, project alliances are more typical than strategic alliances. However, partnering, which can be seen more as a framework for collaboration than a project alliance (Lahdenperä 2012, Walker & Lloyd-Walker 2015), also predated the launch of project alliances in the infrastructure and construction industry.

One widely used definition of a project alliance (from Australia) describes it as a “method for procuring, where all parties are required to work together in good faith, acting with integrity and making best-for-project decisions” (Department of Treasury and Finance 2010: 9). In addition, it is described how an integrated, collaborative team makes unanimous decisions on all key project delivery issues, and that alliance agreements are premised on joint management of risk for project delivery, with joint management of risks and shared project outcomes (Department of Treasury and Finance 2010).

Yet despite the many efforts to increase understanding of this relational project delivery model, there are still divergent views of the concept and the terminology applied (see Table 5). Although there is some shared understanding of the salient features of project alliances, authors and practitioners emphasize different viewpoints in defining the concept.

Table 5. Definitions of a project alliance.

Source	Definition
Walker <i>et al.</i> (2002)	"The philosophy for the alliance concept is that when the best available people are hired to work in a truly collaborative and cooperative way, then the project outcome will represent best value. Alliancing requires a highly sophisticated and involved client to drive and benefit from the process."
Ross (2003)	"A 'project alliance' is where an owner (or owners) and one or more service providers (designer, constructor, supplier, etc.) work as an integrated team to deliver a specific project under a contractual framework where their commercial interests are aligned with actual project outcomes."
Ingirige & Sexton (2006)	"An alliance is defined, for the purposes of this paper, as any voluntarily initiated cooperative agreement between firms that involves exchange, sharing, or co-development, and it can include contributions by partners of various resources (Gulati 1998)."
Davis & Walker (2009)	"Briefly, project alliances are a particular kind of procurement system that rely on virtual organisations generating new knowledge that enable teams to solve interrelated problems in a complex time constrained environment."
Mistry & Davis (2009)	"Cooperative arrangement between two or more organizations working towards achieving common goals and objectives for a specific project."
Lahdenperä (2009)	"Project alliance is a project delivery method based on a joint contract between the key actors to a project whereby the parties assume joint responsibility for the design and construction of the project to be implemented through a joint organization, and where the actors share both positive and negative risks related to the project and observe the principles of information accessibility in pursuing close cooperation."
Love <i>et al.</i> (2010)	"Alliance contracting is a relationship based contractual arrangement that can be used to ameliorate teamwork and the collaborative and cooperative nature of the project delivery process for infrastructure projects."
Walker <i>et al.</i> (2013)	"... a method of procuring ... [where] All parties are required to work together in good faith, acting with integrity and making best-for-project decisions. Working as an integrated, collaborative team, they make unanimous decisions on all key project delivery issues. Alliance agreements are premised on joint management of risk for project delivery. All parties jointly manage that risk within the terms of an 'alliance agreement', and share the outcomes of the project (Department of Treasury and Finance: 9)"
Jefferies <i>et al.</i> (2014)	"Alliances are an agreement between two or more entities who undertake to work cooperatively, on a shared risk and reward basis, for the purpose of achieving agreed outcomes based on principals of good faith and trust and an open book approach."
Plantinga & Dorée (2016)	"A method of procuring (and sometimes managing) major capital assets, where a state agency (the Owner) works collaboratively with private sector parties (Non-Owner Participants or NOPs)" (following State of Victoria 2010).

Although the definitions of project alliance vary across authors, all include the elements of inter-organizational collaboration and common goals and objectives. Based on these definitions or descriptions, a project alliance can be understood as a multiparty contracting arrangement between two or more entities who undertake the work cooperatively on a shared risk and reward basis for the purpose of achieving agreed outcomes based on principles of good faith and trust (Davis & Love 2011, Love *et al.* 2011, Jefferies *et al.* 2014, Lloyd-Walker *et al.* 2014, Walker & Lloyd-Walker 2015). Project participants work together as an integrated, collaborative team that act with integrity (Ross 2003, Lahdenperä 2012) and commit to open-book, “no disputes”, best-for-project unanimous decision-making processes, as well as to a joint management structure (Department of Treasury and Finance 2010, Walker *et al.* 2013). A project alliance is typically described as a procurement method (Davis & Walker 2009, Walker *et al.* 2013, Plantinga & Dorée 2016) or as a cooperative agreement or arrangement between two or more organizations (Ingrige & Sexton 2006, Love *et al.* 2010, Jefferies *et al.* 2014). From a market economy perspective (Powell 2001), an alliance project can be seen as a flattening of organizational hierarchies, reducing organizational boundaries in support of networks of collaboration and restructuring competition between organizations, within and across industries. While definitions of project alliance focus on the key features of collaboration, contractual and commercial issues, risk sharing principles and common goals, they rarely address the managerial practices or joint processes required to initiate and implement alliance projects successfully.

Understanding the key features and principles of project alliance has emerged as one of the main themes in the project alliance literature of the last decade (e.g. Manley 2002, Walker *et al.* 2002, Hauck *et al.* 2004). Table 6 illustrates the research perspectives and themes that have attracted most attention from academics since the beginning of the twentieth century. In addition to the project alliance features and principles such as antecedents for alliance and applicability of the model, scholars showed an interest in themes related to a project alliance agreement, especially in the early phases of project alliance history. Alongside these somewhat technical aspects, alliance team and project culture attracted increasing scholarly attention, along with collaboration and relationship management. There has also been significant interest in the performance and success of alliance projects as defined by key success factors (Love *et al.* 2010, Jefferies *et al.* 2014) and performance indicators (Ibrahim *et al.* 2013a, Chen & Manley 2014). Additionally, some scholars have sought to develop project alliance practices and tools, as for example by defining frameworks for the development and deployment of lean

philosophy (Vilasini *et al.* 2014). The most recent emergent perspectives and themes in the project alliance literature relate to project governance and strategic management (Chen & Manley 2014, Guo *et al.* 2014, Manley *et al.* 2014).

Table 6. A project alliance research perspectives and themes.

Research perspective	Themes	Authors
Project alliance features and principles	Features and definition of PA concept, illustration of benefits and PA in practice, antecedents for successful alliances, applicability of the model, relation to other relational project delivery forms	Manley (2002), Walker <i>et al.</i> (2002), Hauck <i>et al.</i> (2004), Ingirige & Sexton (2006), Chen <i>et al.</i> (2012), Clegg <i>et al.</i> (2002), Sakal (2005), Lahdenperä (2012), Yenug <i>et al.</i> (2007), Walker <i>et al.</i> (2013), Walker & Jacobsson (2014), Walker & Lloyd-Walker (2016), Vilasini <i>et al.</i> (2014), Plantinga & Dorée (2016)
Performance management and success	Identifying critical success factors for PA, performance monitoring and measurement, developing performance indicators, value for money, effectiveness of contractual and relational governance	Manley & Chen (2016), Lingard <i>et al.</i> (2007), Love <i>et al.</i> (2010), Ibrahim <i>et al.</i> (2013a), MacDonald <i>et al.</i> (2012), MacDonald <i>et al.</i> (2013), Jefferies <i>et al.</i> (2014), Walker <i>et al.</i> (2015), Ping <i>et al.</i> (2015)
Development of PA practices, tools and methods	Lean thinking, relationship development process, framework for process improvement, enabling and promoting organizational learning	Love <i>et al.</i> (2002), Love <i>et al.</i> (2015a), Love <i>et al.</i> (2015b), Davis & Love (2011), Vilasini <i>et al.</i> (2014), Love <i>et al.</i> (2010), Love <i>et al.</i> (2016), Ibrahim <i>et al.</i> (2015)
Governance	Formal and informal governance mechanisms and structures	Clegg <i>et al.</i> (2002), Chen & Manley (2014), Manley <i>et al.</i> (2014), Ping <i>et al.</i> (2015), Guo <i>et al.</i> (2014)
Alliance team and project culture	Partner search and team selection, team integration, human capital, organizational commitment, leadership, developing motivation and trust, organizational behavior, work-life balance, job satisfaction, no-blame culture, cultural transformation, effect of culture on ambiance, attitudinal change, designing alliance culture of collaboration, subcontractor integration	Lingard <i>et al.</i> (2007), El Asmar <i>et al.</i> (2009), Love <i>et al.</i> (2011), Ibrahim <i>et al.</i> (2013a), Walker & Lloyd-Walker (2014), Clegg <i>et al.</i> (2002), Rahman & Kumaraswamy (2004), Lloyd-Walker & Walker (2011), Lloyd-Walker <i>et al.</i> (2014), Ibrahim <i>et al.</i> (2015), Davis & Walker (2009), Walker <i>et al.</i> (2001), Walker <i>et al.</i> (2013), Dainty <i>et al.</i> (2001)

Research perspective	Themes	Authors
Collaboration and relationship management	Reinforcing collaboration, initiatives and barriers for collaboration, relationship development, motivation to collaborate and form alliances, creating enthusiasm and commitment to support collaboration	Bresnen & Marshall (2000), Ingirige & Sexton (2006), Love <i>et al.</i> (2010), Davis & Love (2011), Walker & Lloyd-Walker (2016), Walker (2002)
Strategic management	Choosing procurement form, decision to adopt PA model, applicability of PA to other construction projects, combining project delivery forms	Walker & Jacobsson (2014), Walker & Lloyd-Walker (2016), Plantinga & Dorée (2016)
Project alliance agreements	Commercial framework: Risk/reward allocation, compensation model and incentives, target-cost arrangements, payment mechanisms, obligation to act in good faith, governance structures, price competition, no-blame clause in contract, preparing a framework for cost arrangements	Lahdenperä (2010), Bresnen & Marshall (2000), Laan <i>et al.</i> (2011), Love <i>et al.</i> (2011), Sakal (2005), Scheublin (2001), Lahdenperä (2016a), Lahdenperä (2016b), Walker <i>et al.</i> (2001), Boukendour & Hughes (2014)

The literature review confirms that while the majority of the project alliance research has focused on technical aspects, contractual and commercial set-ups, successful practices and performance implications (Love *et al.* 2010, Chen *et al.* 2012, Jefferies *et al.* 2014), considerably less attention has been devoted to empirical study of the kinds of processes actually occurring in practice within alliance projects. In particular, few studies have focused on the social dimensions of collaboration in project alliances (Bresnen & Marshall 2002, Laan *et al.* 2011).

2.1.2 The life cycle of an alliance project

The mainstream view is that a project alliance is an appropriate delivery model particularly for projects exhibiting such characteristics as complexity, high uncertainty, tight timeframes, complex stakeholder issues and complex external threats (Chen *et al.* 2012). When the owner/customer organization begins to consider the most suitable project delivery model for a forthcoming project, these characteristics (as well as, for example, the organization's ability to commit capable resources to the project) will affect the decision to select the project alliance model. The owner/customer organization will be involved throughout the project life cycle, which includes the following phases: planning, procurement, development,

implementation and warranty (Ross 2003, Lahdenperä 2009). The next section briefly describes the key actions and targets in each phase.

Strategy phase: Choosing a procurement method and delivery model (a project alliance or another model) is a strategic decision that needs to be made before the tendering process can commence. An owner/customer defines the targets and strategy for procurement and formulates a procurement plan to clarify the project's true goals and entailed preconditions for contractors.

Procurement phase: The alliance group is founded primarily on qualitative criteria, assessed by means of written documents, workshops and negotiations. The aim is to find the most suitable alliance organization, which includes the owner and service providers (designer, constructor, supplier etc.), to work as an integrated team in delivering a specific project, where commercial interests are aligned with actual project outcomes (Ross 2003). Three to five suitable partners or consortiums are usually chosen for the tendering process. The first offering includes qualitative characteristics (Lahdenperä 2012) such as evidence of profitable operations, organization and key persons, cost-efficiency of the strategy, costs, how the project is to be monitored, ability to understand the alliance procedure and management of the process. The owner organizes negotiations to obtain further information about consortium abilities, such as leadership and a consortium's understanding of what a project alliance is about. Following this negotiation phase, the owner either decides on the best consortium to continue the process or selects two consortiums for deeper negotiation and workshops. At this point, the price component is also included in the decision making process (Lahdenperä 2012). The consortium that achieves the highest score continues to the next stage of the process by undersigning the contract for the development phase.

Development phase: The alliance organization is formed, including all the chosen service providers and the owner. The alliance group (Ross 2003) develops planning and deployment plans as an integrated team, defining target out-turn cost and schedule, key result areas, more explicit content for the project and the methods and processes to be used. After development planning, key result areas and target out-turn cost are accepted by the owner, and the contract for the implementation phase can be undersigned. At this stage, the owner can still withdraw from the process.

Implementation phase: The construction project is implemented according to the plans and principles defined in the project development phase. Improving efficiency and productivity remains central, and the development process continues to look for improved solutions and innovations that will assist in achieving or even

exceeding the targets set in the project development phase. In this phase, professional management and leadership skills are crucial.

Warranty phase: The project alliance is jointly responsible for maintenance during the warranty period (usually five years). The target out-turn cost defined in the project development phase also includes maintenance and correction of defects.

2.1.3 Project alliance performance

To date, experiences of relational project deliveries in complex infrastructure and construction industry have been encouraging (e.g. Manley 2002, Walker *et al.* 2002, Hauck *et al.* 2004, Rooney 2006, Lingard *et al.* 2007, Wood & Duffield 2009, Jefferies *et al.* 2014, Vilasini *et al.* 2014, Manley & Chen 2016). For example, Manley and Chen (2016) noted that projects run by teams selected competitively on non-price criteria prior to the pricing stage exhibit significantly better performance than projects based on price competition. Wood and Duffield (2009) demonstrated that deploying the project alliance model makes it possible to avoid disputes, improve non-cost outcomes and commence projects earlier than when using traditional methods. Their study of Australian alliance project performance included the following findings:

- Schedule performance: Physical works could be commenced many months in advance, and about 93% of surveyed alliances met the client's target completion dates.
- Budget performance: 85% met or came in below the final target out-turn cost.
- Non-price objectives: There were no indications of any dispute between client and contractors that had to be resolved outside the alliance.

Similarly, Walker *et al.*'s (2013) study of the project alliance performance reported the following:

- Schedule performance: About a third of the projects came in under the allotted time, and almost half came in on time. The remaining quarter were delivered later than the original deadline. The principal reason for this time overrun was positive scope change, resulting in an improved and/or enhanced final product. In those instances where projects came in under time, innovation (including accelerated processes) and change of approach to project delivery procurement were cited as contributing factors.

- Budget performance: Approximately half of the projects were completed with a final target out-turn cost that was less than the initial figure.

In addition to these more traditional elements of evaluating the project's success (cost, quality, time), some studies have also assessed the performance and the effects of alliance projects from other perspectives. Lloyd-Walker *et al.*'s (2014) empirical study showed that a project alliance clearly promotes innovative thinking in action and facilitates innovation through collaboration. Lingard *et al.* (2007) found evidence that the collaborative nature of project alliances, as in the sharing of risks and rewards, seems to provide a supportive work environment, where innovative work-life balance initiatives such as the compressed work week can be implemented. However, more research on such issues as societal impacts, health and safety and ethical concerns (Hodgson & Cicmil 2008) would enhance existing knowledge about the performance potential of project alliances. There are also some more critical views of the performance potential of project alliances and the level of investment demanded in terms of time and training (Merrow 2011). Bresnen (2007) has questioned the general possibility of shaping and sustaining a collaborative philosophy in a temporary, project-based setting. Sanderson (2012) noted a tension between conscious *ex ante* design of the penalty/reward scheme and an unknowable future. When linked to financial penalties and rewards, he questioned how meaningful targets can be set for performance indicators without appropriate benchmarking. This is especially the case when alliance projects are largely unknowable, as they may include multiple changes along the way, related to scope or to unexpected events that cannot be anticipated prior to launch. Clearly, then, project alliances also include some fundamental challenges requiring further investigation.

2.2 Project alliance capability

2.2.1 Organizational capabilities

An organizational capability refers to an organization's ability to perform a coordinated set of activities to achieve a particular end result and to purposefully create, extend or modify resources (Helfat & Peteraf 2003). At this general level, capabilities have been defined as "bundles of skills and accumulated knowledge exercised through organizational processes that enable firms to coordinate activities and make use of their assets" (Day 1994: 38). Capabilities are seen as strategically

vital assets that determine an organization's ability to survive, adapt and compete in a dynamic environment (Davies & Brady 2000), creating a competitive advantage (Teece & Pisano 1994, Teece 2014). In the project business literature, the concepts of capability and competence are used somewhat interchangeably (e.g. Suikki *et al.* 2006, Söderlund & Tell 2006), but in general, while competence usually refers to knowledge and skills at the individual level, capability is an organization-level concept. In addition to knowledge and skills, organizations also need routines and structures to build capability. Routines or "economies of repetition" (Davies & Brady 2000) have been identified as a key concept in the analysis of organizational capabilities (Nelson 1991, Chandler 1992, Söderlund 2005a).

In their research on organizational capabilities, Davies and Brady (2000) proposed that, along with functional and strategic capabilities, organizations need effective project capabilities to design and implement complex product systems (Figure 4). Indeed, managing projects is considered a core capability for project-based firms (Söderlund 2005a). However, Söderlund (2005b) argued that project capability is among an organization's strategic capabilities rather than a complementary organizational capability as suggested by Davies and Brady (2000).

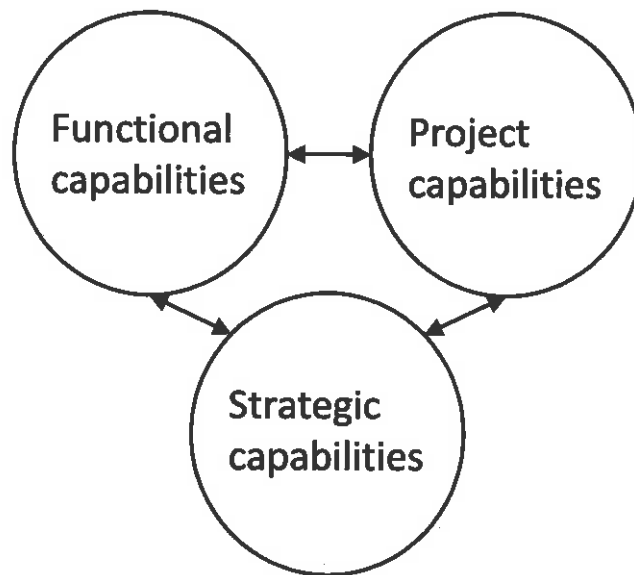


Fig. 4. Organizational capabilities (Davies & Brady 2000).

In general, strategic capabilities are located at the strategic and functional levels in the organization and support all operating business units, projects and functional

organizations (Davies & Brady 2000). For example, strategic management is responsible for allocating resources and implementing long-term plans (Chandler 1990); clearly, then, strategic capabilities are also central to project management. Functional capabilities are distributed across an organization's different departments (such as procurement and manufacturing) and are utilized repeatedly across different projects (Davies & Brady 2000). Organizations need project capabilities if they are to operate effectively and avoid losing any knowledge accumulated during a project. Davies and Brady (2000) defined project capability as the "management organization, processes and procedures required to be successful in bidding for and in completing projects within budget, on schedule and to unique customer specifications" (Davies & Brady 2000: 951). Söderlund (2005b: 455) defined project competence as the "firm's ability to generate/select and implement/execute projects skillfully." Söderlund and Tell (2006) further proposed that an organization's project capability (competence) comprises four building blocks: project generation, project organizing, project leadership and project teamwork. Söderlund (2005b) also emphasized that when assessing an organization's project capabilities, its capacity to handle projects of different types should be noted.

2.2.2 Alliance capability

Prior research on alliance capability within the field of strategic management suggests that some organizations are more successful than others in their alliances (Schreiner *et al.* 2009). These organizations have been found to possess better organizational capabilities in managing alliances—that is, alliance capability (Schreiner *et al.* 2009). Specifically, they possess the ability to manage interdependencies with a partner through coordination, to credibly convey information and knowledge to that partner and to develop social bonds with them (Schreiner *et al.* 2009). Similarly, Sluyts *et al.* (2011) suggested that having the capabilities to build an open and innovative organizational culture and to commit the top management team could stimulate sharing of thoughts, experiences and associated learning, impacting positively on alliance outcomes.

Ritter *et al.* (2002) described how alliance capability encompasses a number of activities and skills needed by an organization for successful network management. In general, alliance capability has been defined as a set of skills or features that organizations need when managing alliances (e.g. Gulati 1998, Kale & Singh 2007, Schreiner *et al.* 2009, Wassmer 2010) or in different phases of the life cycle of an

alliance project (Gulati 1998). Based on the previous literature on alliance capability (e.g. Schreiner *et al.* 2009, Schilke & Goerzen 2010), Wang and Rajagopalan (2015) proposed that an organization needs different abilities in the pre-formation and post-formation stages of a project. First, for an alliance to become functional, an organization needs to identify and select potential collaborators, and to negotiate the terms and structures of the collaborative agreement. When an alliance is established and moves to the post-formation stage, an organization needs implementation capabilities such as coordination, communication, bonding, intra-organizational learning and exiting if it is to create and capture value from the partnership. Of particular significance are the specific internal processes, tools, functions and structures that can capture and diffuse alliance knowledge (Sluyts *et al.* 2011), along with an ability to adapt to changing conditions (Schreiner *et al.* 2009). According to Teece (2014), in addition to ordinary capabilities (such as best practices), which enable the firm to perform definable tasks, organizations need dynamic capabilities to be able to adapt to changing conditions and to have a better chance of establishing and maintaining competitive advantage in contexts, where change is rapid.

Finally, in order to create alliance capability, organizations need to be able to build routines from the aforementioned activities and to incorporate them into the working culture. Indeed, it is impossible to create alliance capability solely by accumulating experience through further alliances (Sluyts *et al.* 2011); rather, the accumulated knowledge needs to be transferred within the organization and between projects in order to be able to build best practices that will benefit the organization in the future.

2.2.3 Capability requirements for organizations participating in alliance projects

Traditionally, project management activities and research have focused on operations, such as planning and scheduling or optimizing resources. Now, however, the focus has shifted toward strategic implementation, with an emphasis on people orientation (Morris 2013, Walker & Lloyd-Walker 2015). Several studies have highlighted a need to broaden project management knowledge and competencies—for example, by deploying reflective practitioners (Winter *et al.* 2006, Turner & Lloyd-Walker 2008, Walker & Lloyd-Walker 2015). In addition, the need has been identified for more extensive team skills (Winter & Szczepanek 2009) and building social capital for the project organization as more important in

relational project delivery than in traditional approaches (Walker & Lloyd-Walker 2015). Indeed, there is no doubt that working in alliance projects demands new capabilities from the participating organizations and actors.

Successful alliance organizations have been shown to possess better organizational capabilities in managing strategic alliances (Schreiner *et al.* 2009). It has recently been suggested that the participating organizations' capabilities in developing and adapting new processes that facilitate innovation and collective learning are critical for the success of the alliance (Love *et al.* 2015b). In addition to continuous learning, other critical success factors for project alliances have been identified, indicating the kinds of capabilities organizations may need for successful project implementation (Table 7).

Table 7. Key success factors for alliance projects (IV, published by permission of Emerald Group Publishing Limited).

Success factor	References
Commitment of parties	Walker & Hampson (2008), Jefferies <i>et al.</i> (2014), Abrahams & Cullen (1998), Lahdenperä (2009)
Mutual trust	Walker & Lloyd-Walker (2015), Love <i>et al.</i> (2010), Walker & Hampson (2008), Lahdenperä (2009)
Openness—atmosphere, communication, open-book	Lahdenperä (2009), Love <i>et al.</i> (2010), Jefferies <i>et al.</i> (2014), Walker & Lloyd-Walker (2015), Walker & Hampson (2008), Chen & Manley (2014)
Shared best-for-project mindset/culture, cooperative spirit	Walker & Lloyd-Walker (2015), Lahdenperä (2009), Walker & Hampson (2008), Chen <i>et al.</i> (2012)
Mutual goals and objectives	Walker & Hampson (2008), Jefferies <i>et al.</i> (2014), Love <i>et al.</i> (2010), Lahdenperä (2009), Chen <i>et al.</i> (2012)
Joint governance structure (e.g. consensus decision making)	Lahdenperä (2009), Walker & Lloyd-Walker (2015), Chen <i>et al.</i> (2012)
Continuous learning and performance monitoring	Walker & Lloyd-Walker (2015), Jefferies <i>et al.</i> (2014), Lahdenperä (2009)
Facilitation	Jefferies <i>et al.</i> (2014), Lahdenperä (2009), Chen & Manley (2014)
Risk and reward allocation, incentivization	Lahdenperä (2009), Walker & Lloyd-Walker (2015), Chen <i>et al.</i> (2012), Chen & Manley (2014)
Integration: people (e.g. joint alliance office), processes, tools, design integration	Lahdenperä (2009), Walker & Lloyd-Walker (2015), Jefferies <i>et al.</i> (2014), Love <i>et al.</i> (2010), Chen & Manley (2014)
Leadership	Walker & Lloyd-Walker (2015), Love <i>et al.</i> (2010), Chen & Manley (2014)

Success factor	References
Appropriate and adequate resources; best people for project	Jefferies <i>et al.</i> (2014), Love <i>et al.</i> (2010), Walker & Hampson (2008), Lahdenperä (2009), Chen <i>et al.</i> (2012)

Many of these success factors (Table 7) emphasize the significance of competent individuals in an alliance team. However, as noted by Walker and Lloyd-Walker (2015), selection of personnel for such teams should look beyond the best employees in terms of staff profile or technical skills, focusing instead on creating a unified alliance organization by utilizing staff's social capital and competences. In addition to strong technical skills, emotional intelligence skills development has been found to improve project team performance (Turner & Lloyd-Walker 2008, Walker & Lloyd-Walker 2015). Concrete activities are also needed to facilitate the deployment and further development of all project actors' competencies.

2.3 Collective capabilities for managing project alliances

To improve capabilities for managing alliance projects, an inter-organizational project organization needs to be able to collectively manage and lead the project. This requires strong inter-organizational integration and a collaborative working environment that supports the project's best interests, as well as joint processes enabling and supporting continuous development. Achievement of key alliance project targets depends on the quality and appropriateness of the foundational facilities that drive team behaviors to achieve project goals (Walker & Lloyd-Walker 2016). In a project alliance, inter-organizational integration is considered fundamental to managing the project, and social processes of collaboration are salient drivers of team behaviors in pursuit of project goals. Without the requisite processes and means, such as project identity formation and opportunity management activities, appropriate integration management principles are necessary but not in themselves sufficient to reinforce desired behaviors and results (Walker & Lloyd-Walker 2016).

2.3.1 Inter-organizational integration management

Managing inter-organizational integration

Organizations must be able to deal with uncertainty from multiple sources, handling and coordinating problems associated with diverse tasks and their interdependencies (Tushman & Nadler 1978). Along with task uncertainty and task complexity, uncertainty in the organizational environment demands integration of inter- and intra-organizational units (Tushman & Nadler 1978, Mitropoulos & Tatum 2000). To manage integration, organizations must develop information processing mechanisms—considered here as integration mechanisms—that can deal with both external and internal sources of uncertainty.

According to the contingency view of organizational integration, the leading principle in managing integration is to match integration mechanisms to actual information processing requirements (Tushman & Nadler 1978). Organizations that manage integration effectively do not over- or under-integrate but always align and match their integration mechanisms with requirements and demands. Fit can be understood as the effectiveness of alignment of integration capacities and requirements (Lawrence & Lorsch 1967, Turkulainen 2008).

As tools for managing integration, integration mechanisms link different parts of an organization to accomplish a collective set of tasks (Van de Ven *et al.* 1976). It has been suggested that an organization's coordination mechanisms (which are similar to integration mechanisms) are “the most basic elements of structure” (Mintzberg 1989: 101), and the literature reports various classifications of integration mechanisms (Galbraith 1973, Van de Ven *et al.* 1976, Tushman & Nadler 1978, Mitropoulos & Tatum 2000, Turkulainen 2008, Okhuysen & Bechky 2009). Based on the information processing view (Van de Ven *et al.* 1976), integration mechanisms can be classified in terms of three distinct modes: impersonal, personal and group. In the impersonal mode, integration is achieved by means of pre-established plans, schedules and forecasts, by formalized rules, policies and procedures and by standardized information and communication systems (Van de Ven *et al.* 1976, Turkulainen *et al.* 2015). In the personal mode, individuals serve as mechanisms for mutual task adjustment through a variety channels of communication, such as liaison and boundary-spanning roles (Lawrence & Lorsch 1967). In group mode, integration can be attained by a group of persons, such as cross-unit teams, meetings and integrative departments (Van de Ven *et al.* 1976, Turkulainen *et al.* 2015). In their categorization of integration

mechanisms in the design and construction industry, Mitropoulos and Tatum (2000) proposed that degree of integration depends on the use of available contractual, organizational and technological integration mechanisms, which may include impersonal, personal and group integration modes. The present study draws on this perspective.

Integration dynamics

During a project, integration requirements are seen to be in constant flux. Complex and uncertain projects pose particular demands in this regard, as reciprocal interdependence and unpredictable environmental conditions typically require high levels of mutual adjustment (Morris 2013: 57). In such cases, integration by mutual adjustment involves gathering new information, working collaboratively and responding to emergent and unforeseen problems in real time (Davies & Mackenzie 2014). The integration challenge is greatest where there are interdependencies within and between organizations (Thompson 1967); this is commonly the case in complex projects, where the actions of each party must be mutually adjusted to the actions of others (Morris 2013). While simpler projects are characterized by more predictable environments and sequential task interdependencies and can rely on planned and routinized integration, more complex, uncertain and time-critical projects require mutual adaptation and continuous adjustment of integration mechanisms (Shenhar & Dvir 2007, Davies & Mackenzie 2014).

The process perspective treats integration mechanisms as activities that are continuously constructed and developed through social interactions that give them validity and meaning (Jarzabkowski *et al.* 2012). Prior research offers some evidence of the dynamics of coordination practices in organizations, as in Adler's (1995) classification, which details how inter-organizational coordination mechanisms change during the different phases of the design and manufacturing process. However, although unplanned contingencies and organizational responses are clearly important issues, informal and emergent coordination practices such as mutual adjustment (Thompson 1967) and lateral relations (Galbraith 1974) have remained largely unexamined.

Integration management in alliance projects

The effective management of integration is central to complex, inter-organizational projects such as alliance projects, where inter-organizational collaboration is

essential. For example, integrating company-based working groups is critical if teams are to work effectively (Baiden *et al.* 2006) and to empower potential synergies (Kumaraswamy *et al.* 2005). Certainly, the possibilities for integration in alliance projects are enhanced by early involvement of key parties, transparent finances, shared risks and rewards, joint decision making and a multiparty contract (Rutten *et al.* 2009, Lahdenperä 2012). Yet although a project alliance promotes integration in project organization, it remains challenging to sustain a collaborative culture (Ibrahim 2013a) encompassing the diverse competences of people with no experience of working together (Baiden *et al.* 2006). In addition, the varying integration requirements over an alliance project's life cycle pose specific challenges for managing integration.

Prior research (e.g. Kumaraswamy *et al.* 2005, Ibrahim *et al.* 2013a) has acknowledged the importance of developing integration practices in construction projects, notably in studies of team integration and measurement of team integration performance. According to Baiden *et al.* (2006), integration practices promote a working environment where participants can change information freely, free flow of communication has been identified as one of several indicators of successful alliance team integration (Ibrahim *et al.* 2013a). Others include team leadership, trust and respect, single team focus on project objectives, collective understanding, commitment of the alliance management team and creation of a co-located alliance team.

2.3.2 Managing social process of collaboration

Projects are social arrangements (Winter *et al.* 2006) that are built by people, for people, through people (Morris 2013). In similar vein, projects and their outcomes can be considered the result of ongoing structuring and sense-making among people who share the same goal (Cicmil 2014). The need for better integration and collaboration of construction project teams has been widely recognized (e.g. Bresnen 2010); indeed, prior research has argued for deeper studies of the complexity of construction projects as social settings (e.g. Cicmil & Marshall 2005), entailing an increased focus on people's interactions and relationship building.

Understanding the nature of interaction among project actors is considered important in understanding how people cope with complex project settings (Engwall 2003) such as inter-organizational alliances, where ambiguity is created by multiple and conflicting interests, roles, identities and asymmetries of power (Cicmil & Marshall 2005). Here, the social process of collaboration relates to

people's interactions and relationship building and development in the alliance project context, emphasizing the significance of inter-organizational collaboration. The concept of organizational identity is utilized to make sense of complex social processes and interactions in alliance projects.

Organizational identity as a concept

Identity is a core concept when making sense of and explaining the actions of an individual, an organization or even a nation (Gioia *et al.* 2013). This research focuses on organization-level identity and, in particular, on identity in a temporary organization. Reflecting and defining who we are, what we stand for, what we want to be, what is unique about us, how we differ from other organizations and how we are similar—these questions are typically of interest to organizational members as well as to researchers. Identity distinguishes an organization from other similar organizations (Albert & Whetten 1985, Voss *et al.* 2006). In practice, an organization's identity affects how people interpret issues, identify threats, craft strategy, communicate with each other and external stakeholders, and resolve problems, as well as influencing the goals and customers they pursue (Albert & Whetten 1985, Voss *et al.* 2006). It has even been suggested that the primary goal of leadership may be to establish a unified identity that organizational members understand and follow (Brown & Starkey 2000, Voss *et al.* 2006).

Organizational identity has been defined in various ways. The classical account views it as a system of claims encapsulating what the organization stands for, and as a set of beliefs shared by its members about the organization's central essence, its distinctiveness or uniqueness in relation to other organizations and its enduring qualities, denoting continuity (Albert & Whetten 1985). Organizational identity is also visible, shaped for example by the organization's name, mission statement, goals, values, practices, actions and shared symbols (Scott & Lane 2000). In the eyes of managers and stakeholders, these elements differentiate the organization from others.

As an indicator of how members perceive and construct their organization, organizational identity is generally considered fundamental to success. Voss *et al.* (2006) confirmed the effect of identity on performance by showing that firms perform less well when leaders disagree about organizational identity—in other words, when there is no cohesive organizational identity. Dutton and Dukerich (1991) suggested that disagreements about organizational identity negatively affect an organization's members, and that organizations with multiple identities are more

likely to engage in conflict than those with a uniform identity (Pratt & Foreman 2000). The fact that employees identify with either a permanent or a temporary system and their differing organizing principles can create tensions between project actors (Arvidsson 2009, Burke & Morley 2016), which may in turn affect organizational identity formation in both systems.

However, although the link between an organization's success and a uniform identity seems obvious, it has also been suggested that identity disagreement among top leaders can actually help organizations succeed (Voss *et al.* 2006). Indeed, although a collaborative project identity mostly supports and enhances performance in alliance projects, the comfort of the alliance ambience (Walker & Lloyd-Walker 2013) and the strong impetus for unanimity can in some instances hinder continuous improvement, leading to groupthink (Hällgren 2010). In groupthink, people are deeply involved in a cohesive group whose members' pursuit of unanimity overrides their willingness to consider alternative courses of action (Janis 1972); as a consequence, possibilities for improvement may remain hidden. In an isolated project environment, the combined effect of a leader pursuing personal gain, a lack of decision methodology and homogenous members may increase groupthink (Hällgren 2010). However, groupthink can be avoided by discussing ideas with people outside the group, inviting experts to meetings and using open sessions to reconsider alternatives.

While projects usually have an identity, this is rarely communicated (Walker & Lloyd-Walker 2015) to people working on the project and less again to project outsiders. Some more iconic projects, such as Sydney Opera House (Murray 2004), have a well-articulated identity that is part of the project vision, but more often, project identity is largely ignored (Walker & Lloyd-Walker 2015). Organizational identity formation has been characterized as a pivotal phase in a new organization's development in well-established fields, fostering acceptance and legitimacy (Gioia *et al.* 2013). However, in other domains with no clear industry identity, as in the case of emerging industries (Clegg *et al.* 2007), organizations need to construct their own identity and to establish ties within an environment that does not yet recognize them as a legitimate entity.

Identity formation in a temporary alliance project organization

Prior research on organizational identity has focused mostly on its content and characteristics, factors that influence identity, identity change (Dutton & Dukerich 1991, Reger *et al.* 1994, Elsbach & Kramer 1996) and individuals' process of

identification. The most holistic perspective to date on identity formation processes is Gioia *et al.*'s (2010) research, which focused on identity formation in newly established permanent organizations. Their emergent grounded theory model analyzed the founding of a distinctive new college, suggesting that organizational identity is formed through the interplay of eight key processes: articulating a vision, experiencing a meaning void, engaging in experiential contrasts, converging on a consensual identity, negotiating identity claims, attaining optimal distinctiveness, performing liminal actions and assimilating legitimizing feedback.

Research on identity formation has been conducted mainly in permanent organizational settings (e.g. Gioia *et al.* 2010) and in the industry or field level (Clegg *et al.* 2007) but has rarely addressed institutionally complex settings or situations where legacy and nested identities figure prominently (Gioia *et al.* 2013). These include inter-organizational project settings, which involve actors with varying business logics and multiple organizational identities. Consequently, the elements of time, task, team, and context and characteristics associated with temporary organizations (Lundin & Söderholm 1995, Bakker 2010) can be expected to influence the content and intensity of identity formation activities in such settings.

In addition to temporal aspects, a project alliance as a project delivery model establishes specific requirements for the behavior of participating actors that may affect the project's organizational identity. Joint responsibility for consensus decision-making and risk taking (Lingard *et al.* 2007, Lahdenperä 2012, Vilasini *et al.* 2014) demands strong commitment from all participating actors. These joint actions encourage the development of a shared organizational identity, where each party is expected to work in the best interests of the project, committing to it as an entity rather than acting only in their own interests. In addition, project alliance contracts promote an organizational culture that supports, enhances and motivates people to collaborate and work in the project's best interests. Contractually defined behavioral rules and incentivization mechanisms enhance a sense of collegiality, emphasizing "we" rather than "they" (Walker & Lloyd-Walker 2013).

Although the project alliance aims to build a shared feeling of collaboration and trust among participants, it is nevertheless a temporary arrangement, comprising individuals from different home organizations, with varying roles and levels of commitment. The resultant tensions may create difficulties for collaborative identity formation; for instance, Walker and Lloyd-Walker (2013) reported the challenges of transience as team members moved between alliance and home organization roles. Surfing between different projects and organizations,

these individuals challenge the project organization's harmony as a consequence of their multiple organizational identities.

2.3.3 Innovation management

Large and complex projects involve organizations with diverse and complementary backgrounds, resources, and knowledge (Walker & Rahmani 2016), offering immense possibilities for jointly creating novel ideas and innovative solutions that exploit opportunities emerging over the project life cycle. Researchers have recently begun to address problems associated with the pursuit of innovation in complex, large projects which represent the ideal setting for fostering innovation (Miraglia *et al.* forthcoming). For example, Davies *et al.* (2014) identified a process for organizing and managing innovations in megaprojects. In practice, however, companies participating in complex projects struggle to implement the joint processes, practices, motivation and knowledge that would enable them to fully exploit the opportunities (Olsson 2007, Rutten *et al.* 2009) inherent in such projects. In megaprojects, innovation involves more complex processes (Dodgson *et al.* 2015) than in permanent organizations, usually extending beyond the boundaries of individual organizations (Miraglia *et al.* forthcoming).

Innovation management in alliance projects

In traditionally procured projects, project participants tend to be risk averse because of their concern about the repercussions of failing to deliver on the plan. For that reason, they are usually reluctant to engage in open and collaborative problem-solving (Lloyd-Walker *et al.* 2014). Indeed, knowledge transfer for innovation diffusion demands collaboration, which has been identified as challenging for project participants. There is also evidence that realizing innovations in construction generally requires large multidisciplinary teams and a no-blame culture (Lloyd-Walker *et al.* 2014), which is rarely the case in traditionally procured projects. In addition, traditional project settings do not usually offer specific incentives to develop innovations. However, the project alliance delivery model strongly encourages and motivates efforts to look for better approaches to implementation.

There is some evidence that project alliances are a superior vehicle for innovation in complex construction projects (Lloyd-Walker *et al.* 2014), by virtue of multidisciplinary problem-solving combined with a no-blame culture. Based on

Lahdenperä's (2012) findings from the literature, innovation in construction seems to require both closer integration and improved collaboration, both of which are central elements in project alliances. Manley (2006) showed that project alliances support innovation and improve innovation capacity. Because of their no-blame team culture, they encourage and thrive on collaboration and knowledge sharing, resulting in turn in organizational learning that supports innovation (Rowlinson *et al.* 2006, Lloyd-Walker *et al.* 2014). The project alliance contract's unique "no-blame" behavioral clause is crucial in developing and supporting an integrated, collaborative and information-sharing culture where innovation can evolve through a process of trial and error (Lloyd-Walker *et al.* 2014). Indeed, project alliances encourage innovation and offer the best setting for innovation through collaboration and knowledge transfer within a no-blame culture.

Although project alliances are said to provide a fruitful setting for innovation by creating a culture that encourages knowledge sharing, there is only limited evidence of actual collective practices and processes that help to identify new opportunities and turn them into innovations. Collaboration alone is not sufficient for innovation (Lloyd-Walker *et al.* 2014) because it does not guarantee that knowledge is transferred. As multidisciplinary project networks involve a high degree of uncertainty (Brady *et al.* 2012, Lehtiranta 2014), the present research approaches innovation management—that is, the identification of new ideas and their transformation into innovations—by referring to the opportunity management literature.

Opportunity management in project networks

Risk management is considered a salient aspect of managing projects and uncertainty (Turner 2009, Lehtiranta 2014). Project risk has been defined as an uncertain event or condition that may impact positively or negatively on project objectives (Project Management Institute 2013). However, risk management practices tend to focus on identifying and managing threats (Hillson 2002, Lehtiranta 2014) while overlooking opportunities and failing to consider the management of those opportunities (Ward & Chapman 2003). In emphasizing the integration of threats and opportunities, the concept of "uncertainty" is therefore useful in capturing both types of risk in one management item (Ward & Chapman 2003).

Existing five-step accounts of the risk management process (as planning, identification, analysis, response planning, monitoring and control) have been

blamed for the failure to properly manage opportunities (Atkinson *et al.* 2006, Olsson 2007, Lehtiranta 2014), and improved practices have been called for to manage uncertainty. Most of the uncertainty management literature concentrates on reducing uncertainty (e.g. Atkinson *et al.* 2006), emphasizing the significance of threats while paying less attention to how exploiting uncertainty might reveal opportunities. Although a range of practical tools and methods exist to support uncertainty management, these do not seem to sufficiently support active opportunity management in project organizations. Hillson (2002) noted that there may be a natural resistance to broadening techniques traditionally used in identifying threats to address opportunities. In addition, existing tools mostly identify and evaluate single opportunities, but they have limited application to active and continuous opportunity management, which is central to projects that are complex and dynamic and include evolving processes.

Research on uncertainty management has identified several factors that affect an organization's ability to manage opportunities (Ward & Chapman 2003, Olsson 2007, Lehtiranta 2014). Ward and Chapman (2003) identified organizational culture as the most influential factor enhancing management of opportunities. Olsson (2007) also highlighted external factors such as the ability to communicate with the customer and other functional disciplines and understanding the customer's view of the project. Better understanding of customer expectations and different organizations' influence on project objectives generate a more holistic view that supports management of opportunities.

The inter-organizational project setting highlights the importance of a broader perspective on opportunity management. In complex delivery projects, the traditional single company-oriented uncertainty management approach commonly results in solutions that are too limited (Artto *et al.* 2008). Rather than focusing on single actors, opportunity management should be integrated at the project network level (Artto *et al.* 2008, Pekkinen 2010). In inter-organizational project settings, a broader perspective is needed to address uncertainty management and improve uncertainty-related cooperation. In particular, project networks such as alliance projects need to integrate across organizational boundaries to ensure efficient and effective uncertainty management.

In complex construction projects, a project alliance offers a means of pursuing innovation (Lloyd-Walker *et al.* 2014); as well as stimulating collaborative relations between project participants and addressing the need to improve project performance (Davis & Love 2011), this delivery model also enables a shared approach to uncertainty management by supporting a no-blame culture that

increases innovation capacity and improves opportunity management capability (Lloyd-Walker *et al.* 2014). In addition, the contracts used in project alliances create an organizational culture that supports, enhances and motivates opportunity management practices. The incentivization element of the contract ensures that provisions for financial rewards and penalties will drive motivation; the better the opportunities seized, the greater the benefit for all parties. The behavioral element of the contract requires signatories to work together in good faith, acting with integrity and making decisions that are best for the project (Lloyd-Walker *et al.* 2014). This ensures a work environment that will support and enable opportunity management by integrating the different parties and facilitating multidisciplinary inter-organizational collaboration. The ability to communicate with the customer and to understand their expectations also helps to identify opportunities in projects (Olsson 2007); by integrating the client organization in the project organization, the contractual arrangement in alliance projects strongly enhances opportunity management. An integrated, collaborative, and information-sharing culture (Lloyd-Walker *et al.* 2014) facilitates better opportunity management; a no-blame culture, in which people freely express their ideas and concerns, is known to create a culture of innovation (Dulaimi *et al.* 2010). Indeed, Chapman and Ward (2002) argued that unfavorable features of an organizational culture represent one of the most significant barriers to effective uncertainty management. When a work culture supports open discussion, it lowers the threshold for airing problems and sharing ideas, increasing the potential to exploit new opportunities.

2.4 Synthesis of the literature review

This section synthesizes the literature streams addressing the capabilities needed by organizations in managing project alliances. The synthesis encompasses the key literature streams deployed in the dissertation and the research gaps driving the empirical investigation. Figure 5 provides an overview of this body of knowledge as applied here.

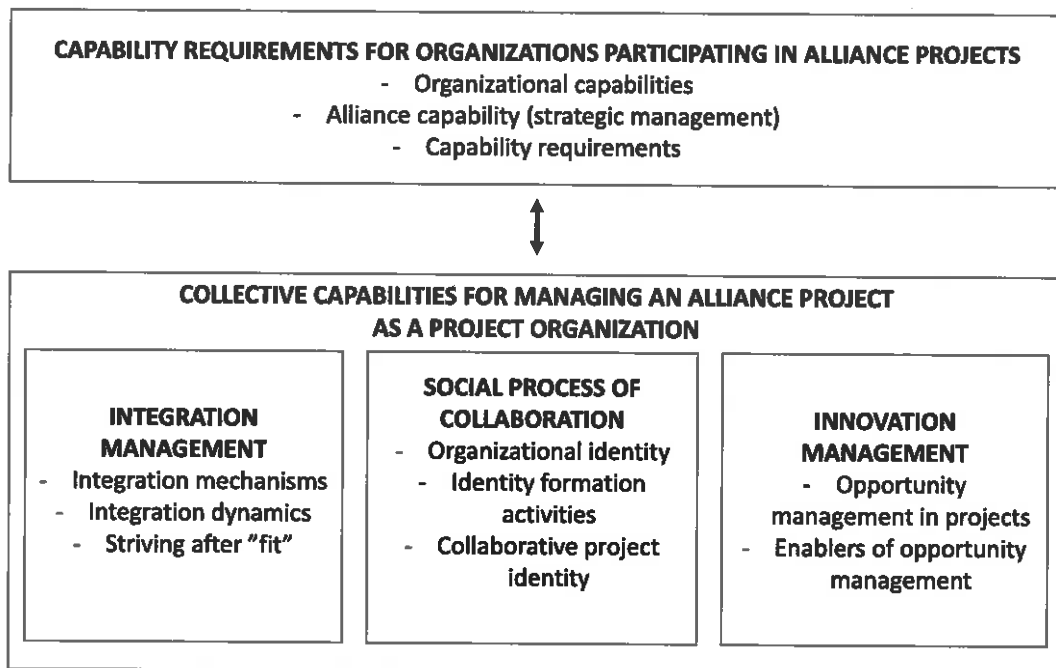


Fig. 5. Synthesis of the relevant body of knowledge.

By strengthening collaboration and integration and offering new work practices and techniques, *a project alliance* facilitates better value creation and optimal results with better quality, less cost, fewer delays and new innovations (Chen *et al.* 2012, Lahdenperä 2012, Walker & Lloyd-Walker 2015). Despite the many efforts to understand project alliances, researchers still diverge in their views of the concept and the terminology they apply. Significant effort has been invested in examining project alliances in terms of features and principles (e.g. Lahdenperä 2012, Walker & Lloyd-Walker 2015); performance management and success (e.g. Ibrahim *et al.* 2013a, Manley & Chen 2016); development of project alliance practices (e.g. Ibrahim *et al.* 2015, Love *et al.* 2015a); and the nature of the agreement and commercial framework (e.g. Lahdenperä 2010, Love *et al.* 2011). However, there remains a lack of in-depth understanding of actual managerial processes. In particular, few studies have focused on the social dimensions of collaboration in project alliances (Bresnen & Marshall 2002, Laan *et al.* 2011). Consequently, there is a need for improved empirical and theoretical understanding of alliance contracting and the *capabilities required of both participating organizations and the inter-organizational project organization*.

The most prominent definitions of the project alliance focus on describing the main features of collaboration, contractual and commercial aspects, risk sharing

principles and common goals. However, to participate successfully in project alliances, organizations need more than an understanding of the basic principles. The project alliance makes new demands on organizations in terms of integration management practices, inter-organizational working culture and common organizational identity, as well as the ability to deal with uncertainties—not only in managing risks but also in making the most of opportunities arising. To operate successfully in inter-organizational alliance project organizations, participating organizations need specific project alliance capabilities. Current knowledge of the concrete managerial processes and capabilities needed in alliance projects remains insufficient.

In complex projects (as alliance projects are), organizations often struggle with constantly changing inter-organizational interdependencies and unpredictable environmental conditions that require continuous development and adjustment of integration mechanisms (Morris 2013). *Integration is among the core organizational capabilities* for addressing interdependency, uncertainty and change in complex projects. However, there have been only limited research efforts to determine the sufficiency of integration mechanisms, how they change in contemporary inter-organizational project contexts and internal and external factors that induce the dynamics of integration mechanisms. A better understanding of integration management and integration dynamics is required in order to equip project-based organizations with better capabilities to manage integration more effectively.

Inter-organizational projects struggle with the social dimensions of collaboration—in particular, how to build a sense of joint belonging and a culture of cooperation (Bresnen & Marshall 2002, Clegg *et al.* 2002, Baiden *et al.* 2006, Van de Ven & Ring 2006, Bresnen 2009, Laan *et al.* 2011, Ibrahim *et al.* 2013a). Collaboration is pivotal in project alliances, making it essential to understand the mechanisms and activities that develop *a collaborative identity for alliance project organization*. The concept of identity is central to making sense of an organization's actions and facilitates examination of the social dimensions of collaboration (Gioia *et al.* 2013). For organizations that are used to working in conventional project setups, the project alliance demands a change of mindset and a totally new working culture. Previous research on organizational identity has focused on the permanent organization, paying only scant attention to the temporal perspective and to identity formation in temporary, multi-firm settings like inter-organizational alliance projects. In particular, existing research has failed to adequately explain how

contextual factors affect the constitution of identity (e.g. Ybema *et al.* 2012), which generates some particular requirements in an inter-organizational project context.

Multidisciplinary alliance project networks offer possibilities for *creating jointly novel ideas and innovative solutions and taking advantage of opportunities* that emerge over the project life cycle. In most industries, performance improvements depend significantly on identified opportunities and innovations (Davies *et al.* 2014). However, the construction industry still struggles to exploit opportunities in projects to overcome poor performance. Companies participating in complex projects experience difficulties in implementing joint processes, practices, motivation and knowledge to fully exploit the potential opportunities inherent in such projects (Olsson 2007, Rutten *et al.* 2009, Lehtiranta 2014). Most approaches to uncertainty management concentrate on managing threats, and opportunity management remains mostly reactive (e.g. Hillson 2002, Ward & Chapman 2003). Opportunity management has proved challenging both in theory and in practice (e.g. Olsson 2007, Lehtiranta 2014). Current practical guidelines for executing opportunity management are deficient (Lehtiranta 2014), and the available management tools are ineffective and inappropriate (Olsson 2007). Few studies have examined concrete practices (Lechler *et al.* 2012, Lehtiranta 2014) to support continuous and active opportunity management over the project life cycle, which is surprising, as efficient strategies for promoting opportunities are likely to improve the probability of success (Lechler *et al.* 2012). Clearly, more research is needed on practical uncertainty management in inter-organizational projects and management practices that support opportunity management.

3 Research contribution

3.1 Integration dynamics

Publication I explores the management of inter-organizational integration—that is, the design, development and adaptation of integration mechanisms—in alliance projects. It presents empirical evidence of integration dynamics in project alliancing, based on an analysis of two infrastructure alliance projects: a complex tunnel construction project and a railway renovation project. The study identifies the kinds of integration mechanism used in infrastructure alliance projects and, in particular, how the use of integration mechanisms changes and evolves during the project life cycle, and what salient triggers lie behind the identified changes.

This new knowledge of the changes in integration mechanisms and the triggers for these changes advances understanding of effective inter-organizational integration in the alignment of integration mechanisms with integration requirements in complex projects. The integration mechanisms in the case projects can be categorized in terms of three different modes: formal governance, organizational and relational arrangements and technological systems. In addition, three central triggers are identified as leading to changes in these integration mechanisms: project life cycle phase, unexpected events and team learning during the project. These findings highlight the need for a greater focus on the processes of integration in construction project contexts. *Rather than focusing on pre-defined integration mechanisms applied under static conditions, the findings highlight the significance of everyday dynamics and change processes in managing inter-organizational integration.* It seems that integration mechanisms at the level of organizational and relational arrangements offer the greatest potential for flexible adaptation of integration practices in pursuit of a fit between integration requirements and integration capacity.

Table 8. Changes in Integration mechanisms in the case projects (life cycle phase (LC), unexpected event (UE), and learning process (L)) (I, published by permission of Emerald Group Publishing Limited).

Integration mode	Change trigger	Cause for dynamics	Changes in integration mechanisms: Liekki project	Changes in integration mechanisms: Rantatunneli project
Formal governance	L	Dissatisfaction with current practices	<ul style="list-style-type: none"> - Performance incentives in commercial model - Processes for collaborative working 	<ul style="list-style-type: none"> - Performance incentives in commercial model - Processes for collaborative working
Organizational and relational arrangements	LC	Reduced need for integration	<ul style="list-style-type: none"> - Coordinating bodies - Cross-functional teams - Inter-organizational meetings and working sessions - Co-location in Big Room 	<ul style="list-style-type: none"> - Coordinating bodies
	UE	Increased need for integration	<ul style="list-style-type: none"> - Continuity of key personnel 	<ul style="list-style-type: none"> - Organization chart and job descriptions - Continuity of key personnel - Coordinating bodies - Liaison roles
	L	Dissatisfaction with current practices	<ul style="list-style-type: none"> - Organization chart and job descriptions - Continuity of key personnel - Co-location in Big Room - Cooperative alliance culture and common values - Inter-organizational meetings and working sessions 	<ul style="list-style-type: none"> - Coordinating bodies - Cross-functional team - Inter-organizational meetings and working sessions - Co-location in Big Room
Technological systems	L	Dissatisfaction with current practices and improved ability	<ul style="list-style-type: none"> - Project bank - Visual tools - Virtual tools 	<ul style="list-style-type: none"> - IT

The empirical findings confirm that integration needs evolve over the project life cycle (see Table 8). Integration needs were particularly high at the beginning of the development phase, when organizational structures were being established and the

collaboration between different functions moved toward shared and jointly defined goals. Contingencies that momentarily increased integration requirements included unexpected events, when all functions needed to respond quickly to find a solution to the emergent problem. In spite of these sudden events, the need for integration gradually decreased as the project progressed. However, the transitions between project phases temporarily increased the need for integration—for example, when bringing new people into the organization. Integration requirements generally decreased over the project's life cycle and increased as a consequence of unexpected events, which are clear directing indicators for managing integration in practice. In addition, the learning process provided opportunities to develop and adjust integration mechanisms. Although integration requirements as such did not necessarily change, the learning process triggered changes in the integration mechanisms, as people were dissatisfied with current practices and signaled the need for adjustments or were able to develop an improved integration capability simply through practice. The integration requirements did not necessarily change; rather, the need for adjustment was a reaction to a notified malfunction or to a change in how people acted.

3.2 Collaborative project identity

Publication II explores the constitution of collaborative project identity in alliance projects. The study contributes mainly to research on organizational identity formation (Gioia *et al.* 2010, Schultz & Hernes 2013) and to the literature on temporary organizations (Bakker 2010) by elucidating how collaborative project identity is constituted in a temporary setting, and how the characteristics of temporary organizations influence this process in terms of the temporal aspects of identity formation. In addition, the study contributes to the wider ongoing research on collaboration and relational forms of project delivery (e.g. Lahdenperä 2012, Walker & Lloyd-Walker 2015). The findings suggest ways in which practitioners can build collaborative project identity in temporary organizations.

The case study examined collaborative project identity formation activities in an alliance project. *The publication identifies six notable activities supporting the formation of collaborative project identity (Table 9): (1) articulating a joint vision for collaborative project identity; (2) converging on mutual conceptions of a collaborative project alliance philosophy; (3) attaining a shared collaborative mentality; (4) designing ways of working with multiple identities; (5) attaining distinctiveness and (6) legitimizing activities.* These identity formation activities

describe and explain how collaborative project identity can be constituted and developed in a temporary organization. They are fundamental supporting elements in forming a collaborative project identity, which consists of the shared collaborative working practices, collaborative values and cooperation that are central to a project organization's self-image.

Table 9. Activities supporting collaborative identity formation in the case project. (II, published by permission of Taylor & Francis Group)

Collaborative project identity formation activities	Sub-activities
Articulating a joint vision for collaborative project identity	Setting initial boundaries and identity claims for the project Involving all parties in establishing the project vision and goals
Converging on mutual conceptions of a collaborative project alliance philosophy	Searching for knowledge of alliance principles and philosophy ("who we are becoming") Expressing concerns about the new way of working Utilizing narratives to make sense of the project
Attaining a shared collaborative mentality	Engaging collaborators for the project Identifying personally with the project's values Distancing from the impermanence of collaboration
Designing ways of working with multiple identities	Enacting formal practices to reinforce the shared feeling of "us" Enacting informal practices to reinforce the shared feeling of "us"
Attaining distinctiveness	Identifying similarities from international examples Differing from traditional infrastructure projects Creating joint external signs and a visual symbol
Legitimizing activities	Ensuring that regulatory demands are met Building legitimacy by constructing and shaping a positive image Receiving validation by communicating with external stakeholders

The findings advance understanding of identity formation, particularly in temporary organizations. The elements of time, team, task and context, which are prominently associated with temporary organizations (Lundin & Söderholm 1995, Bakker 2010), were found to influence the content and intensity of identity formation activities in temporary contexts. Although Saunders and Ahuja (2006) contended that managers should not focus on identity building for project organizations because of deadline pressures, the present findings suggest that a strong collaborative identity may be highly beneficial for project execution and therefore worth striving for. Where an inter-organizational team works together on

a complex task for a limited period of time, involving all parties in establishing project goals, articulating a common system level task and engaging collaboration-oriented individuals accelerates team mobilization and reinforces commitment and collaborative project identity. Although time limits usually shift the focus from interpersonal relations to tasks, challenging the emergence of a shared feeling of “us,” projects can limit the negative effects of an institutionalized ending to identity formation and maintenance by distancing people from the idea of impermanence. From the context perspective, people working on alliance projects need to be able to deal with multiple identities from their home organizations and from simultaneous projects, as these multiple identities can create tensions that challenge identity formation in temporary organizations.

3.3 Opportunity management

Publication III explores how to successfully identify and exploit opportunities in a large multi-organizational infrastructure project. By analyzing an infrastructure alliance project, it was possible to identify key activities for opportunity management, and enablers of active and continuous opportunity management are also discussed. The research contributes to knowledge about the supporting management practices and enablers that facilitate alliance partners’ opportunity management capabilities.

The findings indicate that *different opportunity management activities are emphasized during the project’s life cycle*. The case project organization defined and adjusted opportunity management activities according to the project phase (Table 10). By linking the empirically identified opportunity management activities to the conventional step-based account of the opportunity management process (e.g. Hillson 2002), it was possible to establish how the focus of the opportunity management process changed over the project life cycle.

Table 10. Key opportunity management activities and changing focus of opportunity management process during alliance project life cycle (III, published by permission of Emerald Group Publishing Limited).

Life cycle phase	Key opportunity management activities	Focus of opportunity management process
Strategy	<p>Knowledge acquisition and requirements definition</p> <ul style="list-style-type: none"> - Lessons learned from previous opportunity management processes - Flexible project specifications to leave room for emerging opportunities 	
Procurement	<p>Pre-idea generation and engagement</p> <ul style="list-style-type: none"> - Idea and opportunity generation - Team selection focused on opportunity-oriented individuals 	
Development	<p>Opportunity management process initialization</p> <ul style="list-style-type: none"> - Capability building to improve creative thinking and idea development - Systematic idea generation and development - Development of several parallel design solutions - Integration arrangements to support seizing of opportunities - Contractual and commercial activities to motivate exploitation of opportunities 	
Implementation	<p>Exploitation</p> <ul style="list-style-type: none"> - Systematic Idea generation and development - Technological integration mechanisms to support active opportunity management - Competence building and training of newcomers in opportunity thinking - Contractual and commercial activities to motivate exploitation of opportunities 	

In the case project, the strategy phase prepared the ground for opportunity management by defining the project's boundaries and specifications. During the procurement phase, the project organization found development-oriented people and organizations for the project. The development phase offered an opportunity

for the alliance organization to adopt a new creative way of thinking and to learn and practice how to come up with better solutions and how to make seizing opportunities a routine practice. The development phase was characterized by active opportunity management; it included a significant level of planning activities, such as defining the systematics for processing and supporting idea generation, as well as identifying and evaluating novel solutions, planning responses and monitoring the exploitation of opportunities. This phase taught people how to work in a no-blame culture, to take advantage of a supportive work culture and to do things differently than before. In the implementation phase, people were already thinking about working creatively, and there was no longer a need to invest much effort in planning opportunity management, as the focus was on actively exploiting opportunity management practices developed during the development phase.

The findings highlight the importance of involving every actor in identifying opportunities over the project life cycle, irrespective of role. The evidence supported the selection of people with an opportunity-oriented mindset, along with collaborative working methods and technological mechanisms to create a broader and more integrated perspective on managing opportunities. Motivation to identify and manage opportunities can be reinforced by incentives and contractual arrangements as enablers of active and continuous opportunity management. In addition, *the existence of an idea-generating process enables active opportunity management*. However, the ability to balance control and flexibility—in other words, the degree of formalization—in the opportunity management process is pivotal. The flexibility built into the idea-generation process supports active opportunity seeking and development while the mechanistic process ensures that the opportunities identified are properly analyzed and processed. In general, findings indicate that *the development phase is a fruitful period for developing opportunity management practices and putting the process into practice*.

3.4 Project alliance capability

Publication IV defines the concept of project alliance capability and the elements that constitute that capability, contributing to an organization's success in bidding, managing and operating in alliance projects. The research contributes to the project alliance and general alliance literature within the field of strategy research, as well as to the literature on project capabilities.

The study provides knowledge about the successful initiation and management of alliance projects and offers some preliminary thoughts about why some

organizations may be more successful than others in this regard. Based on this research, it is proposed that *project alliance capability involves (1) the requisite skills to address key issues that arise in initiating and managing alliance projects and (2) the requisite activities to realize an alliance project*. The concept of project alliance capability is situated at organization level, and the capabilities are embedded in the routines and resources of the alliance project. The identified key activities are possible targets for routinization, and for creating best practices that organizations can transfer from one project to another to enhance their competitive advantage. The identified key skills represent areas in which organizations can usefully develop expertise. Table 11 summarizes the most important activities in forming, developing and implementing an alliance project, which effectively define alliance project capability in terms of routines that support project realization.

Table 11. Key alliance project activities Identified from the empirical data (IV, published by permission of Emerald Group Publishing Limited).

Project phase	Key activities
Formation— creating a core knowledge base and training in new skills	<ul style="list-style-type: none"> ➤ Building a knowledge base and training in PA skills (client organization and bidding consortium independently) - Preparing tendering documents: defining goals and estimating budgets - Defining evaluation criteria - Gathering requirements from tendering documents ➤ Building a bidding consortium: finding ideal partners ➤ Selecting a consortium: evaluating bidding documents, selecting 3–5 consortiums, participating in workshop sessions, evaluating suitability of consortiums, specifying tenders, selecting the winning consortium
Development— training collaborative skills collectively	<ul style="list-style-type: none"> ➤ Defining formal governance mechanisms: contractual activities (agreeing shared goals, writing policies and plans); commercial activities (performance incentives and target out-turn cost) ➤ Planning technical implementation: target-value design ➤ Managing uncertainties: identifying and valuing risks and opportunities ➤ Defining organizational and relational arrangements: organization chart, job descriptions, coordinating bodies and cross-functional teams ➤ Building a united team and collaborative working culture: involving project staff in operations, practicing collaboration skills - Learning to use tools, techniques and concepts: Lean principles and tools (e.g. Last Planner), BIM, target-value design - Managing resources: allocating new personnel, redeploying personnel ➤ Organizing tendering process for subcontractors

Project phase	Key activities
Post-formation— developing continuously	<ul style="list-style-type: none"> - Implementing the project at team level - Managing uncertainties: identifying new ideas and development possibilities, potential risks - Managing resources: allocating new personnel, redeploying personnel - Managing stakeholder network (subcontractors and other stakeholders) - Adjusting formal governance mechanisms and organizational and relational arrangements - Developing teamwork and collaborative working culture: involving project staff in operations, collectively practicing collaboration skills - Adapting tools, techniques and concepts: Lean principles and tools (e.g. Last Planner), BIM

In addition to the key activities described above, organizations need a range of skills to address key issues in initiating and managing alliance projects. Based on the empirical data, four groups of skills were identified that comprise an organization’s capability in bidding for, developing and completing alliance projects within budget, on schedule and using new innovative solutions. These skill categories—contractual, behavioral, relational and operational— can be summarized as follows (Table 12):

- contractual skills—the abilities that an organization needs to write, negotiate, and monitor contracts;
- behavioral skills—the abilities that individuals need to successfully participate in alliance projects;
- relational skills—the abilities that an organization needs to participate in inter-organizational relationships; and
- operational skills—the abilities that an organization needs to initiate and manage alliance projects in practice (i.e., to perform project activities).

Table 12. Main alliance project skills identified from the empirical data (IV, published by permission of Emerald Group Publishing Limited).

Contractual skills	Behavioral skills	Relational skills	Operational skills
-Target out-turn cost definition	- Key person selection	- Partner search	- Project management: time, budget, quality
- Mutual goal setting	- Social and bonding skills	- Trust building and maintenance	- Resource, network and uncertainty management
- Uncertainty management: valuing risks and opportunities	- Reflection	- Coordination of activities and resources	- Continuous development
	- Communication		- Lean philosophy and tools deployment
	- Learning		
	- Problem solving		

Contractual skills	Behavioral skills	Relational skills	Operational skills
- Stakeholder management	- Leadership	- Formal and informal interaction	- Facilitation
- Negotiation	- Ability to absorb new knowledge	- Information exchange	
- Adjustment of the project delivery model	- Adaptability to changing conditions	- Sharing, combining, and creating new knowledge	
		- Team building	

Although all the identified key skills are used throughout the project, there are slight differences in emphasis across the project life cycle. Relational skills should be active from the beginning of the procurement process, when firms start building a bidding consortium, and remain important throughout the project life cycle, as do behavioral skills. However, contractual skills, which are important in the first moments of the pre-formation phase, become less important toward the end of the project. Operational skills are emphasized in the development and post-formation phases, when the project is actually planned and executed.

3.5 Results summary

The objective of this dissertation was to study the management of an alliance project and to improve knowledge of capability requirements for managing project alliances. To manage such a project, an inter-organizational alliance project organization needs collective capabilities, particularly in relation to integration management, collaborative identity formation and opportunity management, which are key managerial aspects of project alliances. In addition to these collective capabilities for managing project alliances, each participating organization needs specific skills, as well as an ability to build routines from the project alliance activities. Together, these organizational and project network level capabilities provide a sound basis for successful alliance project execution.

The findings and managerial implications are synthesized in Table 13. First, the integration mechanisms adopted in alliance projects and the central triggers leading to changes in those mechanisms were identified from two case studies. The activities constituting collaborative project identity formation were then identified, as well as how the specific characteristics of temporary organization (time, team, task, and context) influence identity formation activities. The key activities of opportunity management were identified, and the enablers of active and continuous opportunity management were discussed. Finally, the concept of project alliance

capability was defined, and the elements constituting an organization's project alliance capability were identified.

Table 13. Research findings and managerial implications.

Publication	Research question	Key findings	Managerial implications
Publication I	How is inter-organizational integration managed in an alliance project?	<ul style="list-style-type: none"> - Identifies integration mechanisms adopted in two infrastructure alliance projects and three central triggers that led to changes in the integration mechanisms: project life cycle phase, unexpected events and project team's learning during the project - Provides empirical evidence of integration dynamics and of the evolution of integration needs over the project life cycle - Suggests that integration mechanisms related to organizational and relational arrangements offer the greatest potential for flexible adaptation of integration practices 	<ul style="list-style-type: none"> - Provides ideas for managers about how to manage integration during the project life cycle; assists in distinguishing integration possibilities at different stages of the project - Highlights the importance of integration capability as an antecedent for an alliance project organization - Provides a toolbox of integration mechanisms to be exploited in managing inter-organizational integration
Publication II	How can a collaborative project identity be formed in an alliance project?	<ul style="list-style-type: none"> - Identifies six notable activities supporting the formation of collaborative project identity - Provides new insights into the complex social processes of collaboration in inter-organizational projects and into mechanisms for building a sense of joint belonging and culture of cooperation in alliance projects - Advances understanding of elements that are emphasized in identity formation in temporary organizations (time, task, team, and context) and their influence on identity formation activities 	<ul style="list-style-type: none"> - Describes and explains how collaborative project identity can be formed in an alliance project context - Enhances managers' understanding of the significance of an alliance ambience and the means of building it

Publication	Research question	Key findings	Managerial implications
Publication III	How can an opportunity management process be implemented and enabled over the alliance project's life cycle?	<ul style="list-style-type: none"> - Provides empirical evidence of how collaborative opportunity management can be implemented in an alliance project context - Identifies key opportunity management activities and practices for managing opportunities in an alliance project - Links the empirically identified opportunity management activities to conventional step-based accounts of the opportunity management process and illustrates how the focus of opportunity management varies over the project life cycle - Discusses the enablers of active and continuous collaborative opportunity management; emphasizes motivational factors in the project alliance arrangement and the existence of an idea-generating process - Provides insights bridging the opportunity management and innovation management research streams 	<ul style="list-style-type: none"> - Suggests that to strengthen active opportunity management, the project organization needs to define and adjust opportunity management practices according to project phase; for instance, the development phase is a fruitful period for developing opportunity management practices and putting the process in action - Highlights the need for an idea-generation process with built-in elements of control and flexibility - Suggests that opportunity management should be part of a project organization's central processes and integrated with other project management operations - Highlights the need for every actor, irrespective of role, to be involved in identifying opportunities over the project life cycle (activity and involvement)
Publication IV	What elements constitute an organization's project alliance capability?	<ul style="list-style-type: none"> - Presents a conceptualization of project alliance capability - Identifies the main skills for addressing key issues in initiating and managing alliance projects and important activities in realizing an alliance project - Empirically illustrates the elements that contribute to an organization's success in bidding, managing and operating in alliance projects 	<ul style="list-style-type: none"> - The main identified skills suggest key areas in which organizations can usefully develop expertise. - The key activities represent possible targets for routinization and best practices that organizations can transfer from one project to another.

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Publication	Research question	Key findings	Managerial implications
		<ul style="list-style-type: none">Identifies the significance of relational and behavioral skills and offers a life cycle perspective on skill requirementsHighlights the significance of selecting suitable individuals in addition to partner search, and the significance of managing resources and knowhow	

In addition to solid knowledge about the fundamental principles of project alliances, the alliance project organization needs specific collective abilities to manage alliance projects. First, the effective management of inter-organizational integration is central to complex projects, which alliance projects typically are. Alliance projects pose significant challenges for integration, as organizations struggle with constantly changing inter-organizational interdependencies and need to develop and adapt integration mechanisms to meet new demands (integration capability). Project organizations therefore *need to be able to deploy a variety of integration mechanisms* and, in particular, to *adjust the use of these mechanisms* over the project's life cycle, in case of unexpected events and because of team learning during the project.

A second significant collective capability for the alliance project organization relates to project identity and *an ability to form a collaborative identity for the project organization*. Collaborative project identity refers to how organizational members collectively perceive and construct their organization; this is a fundamental factor in relationship development. Although a project alliance as a project delivery method strongly supports formation of a collaborative project identity, the project organization needs to be able to deal with multiple organizational identities from participants' home organizations, simultaneous projects and participants' differing levels of commitment (e.g. full-time workers versus part-time workers). An understanding of the activities that affect collaborative project identity formation can inform project leadership practices.

Third, the alliance project organization needs the collective capability to manage opportunities in projects. Multidisciplinary alliance project networks offer immense possibilities for jointly creating novel ideas and developing practices. Project alliances facilitate innovation in complex construction projects not only by stimulating collaborative relations between supply chain members but also by enabling a shared approach to uncertainty management. However, to be able to generate new ideas and better solutions and to take full advantage of opportunities, the project organization needs to be *able to create joint systematic processes and practices for active and continuous opportunity management and a supporting working culture*. The early phases of the project are central.

In addition to collective capability requirements related to integration, project identity formation and opportunity management, *participating organizations need project alliance capability*—that is, knowledge of important activities in the pre-formation, development and post-formation phases of the project alliances, along with the contractual, behavioral, relational and operational skills that organizations

need for successful alliance project initiation and implementation. Independent of the project organization, participating organizations can develop their project alliance capability. Alliance project activities are targets for routinization and best practices that organizations can deploy from one project to another, and the skills indicate areas in which organizations should build and develop expertise.

Figure 6 synthesizes the research findings. There is prior evidence that a project alliance is a useful means of improving performance in the infrastructure and construction industry. The existing research on project alliances has focused mostly on technical aspects, contractual and commercial set-ups, successful practices and performance implications. However, the present research indicates that a better understanding of actual processes and management practices enhances project implementation. The project alliance requires new managerial capabilities from the participating organizations as well as from the inter-organizational project organization itself.

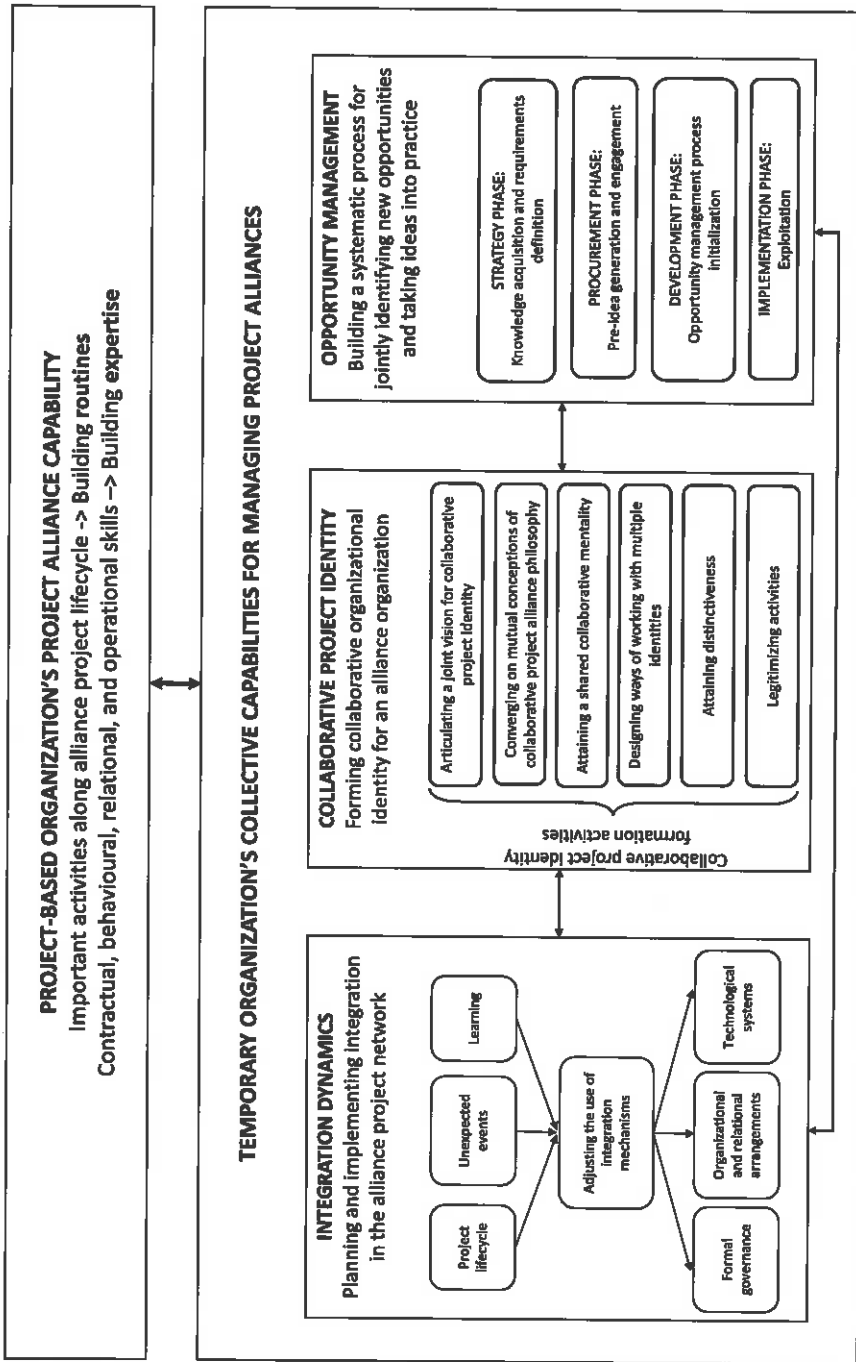


Fig. 6. Synthesis of results.

4 Discussion

This chapter summarizes the key contributions of the dissertation to the relevant literature. The study contributes mainly to the project alliance literature within the field of project management by examining the three central areas of collective capability for managing temporary inter-organizational project alliances and deepening understanding of the project alliance capability requirements for organizations participating in alliance projects. The dissertation also provides new insights to other research streams, including project capability, integration management, organizational identity and opportunity management. After outlining the key theoretical contributions and managerial implications of the thesis, the chapter concludes with a discussion of the reliability and validity of the empirical findings and the limitations of the research, with recommendations for further work.

4.1 Theoretical implications

The dissertation contributes to four themes in the project alliance research stream within the field of project management: integration management, collaborative project identity, opportunity management and project alliance capability. From a general project management perspective, alliance projects are complex and large in scale, implemented by a network of diverse participating firms and organizations and entailing high levels of uncertainty (Artto *et al.* 2011). In managing a project network (Hellgren & Stjernberg 1995), the challenge is to function as a multi-firm enterprise, creating a contractual or organizational arrangement that enhances goal alignment and coordination across the participating organizations (Artto *et al.* 2011). Typically, asymmetry of participating organizations' objectives, diverse interests and identities (personnel and organizational), dynamism in the network, as well as the coordination and integration of actors originating from different environments characterize the complex organizational context of project networks (Artto *et al.* 2011).

4.1.1 Integration dynamics

In the field of project management, it is known that the more complex the project under creation, the more important integration becomes (Artto *et al.* 2011). However, only scant attention has been paid to developing knowledge of inter-organizational integration practices in contexts where processes are neither linear

nor easily decomposable and require flexible arrangements and adaptability to changing conditions (Okhuysen & Bechky 2009). The dynamics of inter-organizational integration has received little attention in the literature on organizational integration (e.g. Turkulainen et al. 2013), with most of the focus on static, intra-organizational integration practices. Previous research has concentrated on defining the indicators and characteristics of integration (Ibrahim *et al.* 2013a, 2013b), but there is little research on integration mechanisms and dynamics—that is, the use and adaptation of integration mechanisms—in alliance projects.

The present research identifies integration mechanisms adopted in two case projects, along with three central triggers that led to changes in those mechanisms: project life cycle phase, unexpected events and team learning during the project. Based on the empirical findings, the management of inter-organizational integration varies across the project life cycle. These observations align with conclusions about integration in manufacturing projects (Adler 1995, Okhuysen & Bechky 2009) and in the context of global project-based firms (Turkulainen *et al.* 2013). However, the other two identified change triggers—unexpected events and organizational learning process during the project—have received little attention in the literature on integration in complex inter-organizational projects. By showing how an organization is likely to respond to unexpected events by inducing changes in existing integration mechanisms, the present findings also link to the research on unexpected events in projects (Hällgren & Maaninen-Olsson 2005, Aaltonen *et al.* 2008, Söderholm 2008, Park & Shang 2013). The third trigger of changes in existing integration mechanisms—learning process during the project—indicates the organization's capacity to synthesize lessons learned from past experience and to continuously improve operations. Learning improves an organization's capacity to respond to everyday dynamics and to manage inter-organizational integration.

4.1.2 Collaborative project identity

Within the field of project management research, previous studies have noted the challenges faced by project networks in relation to a range of tensions; resolution or mitigation of these tensions can create difficult dilemmas for the participating actors (DeFilippi & Sydow 2016). While earlier research has explored the struggles of inter-organizational projects with social dimensions of collaboration (e.g. Baiden *et al.* 2006, Bresnen 2009, Laan *et al.* 2011, Ibrahim *et al.* 2013a), little has been done to advance knowledge of the mechanisms and activities that develop a

common identity for a temporary project network, or to explain how contextual factors affect the constitution of identity (e.g. Ybema *et al.* 2012).

Collaboration is a pivotal aspect of project alliances (Huemer *et al.* 2004, Walker & Lloyd-Walker 2015). Studies of alliance ambience (Walker & Lloyd-Walker 2013)—the sense of being within a culture and the external atmosphere (Walker & Lloyd-Walker 2015)—and how it can be generated and maintained are rare, especially with regard to identity development (Clegg *et al.* 2002, Laan *et al.* 2011). The present findings complement current knowledge by showing how collaborative project identity can be constituted in an alliance project context. Adopting the concept of organizational identity, this research identifies the key activities supporting the formation of collaborative project identity, so contributing to research on organizational identity formation (Gioia *et al.* 2010, Schultz & Hernes 2013), revealing how contextual factors related to temporariness (time, team, task, and context) affect identity formation in inter-organizational projects.

The existence of time constraints (Bakker 2010) has implications for activities of collaborative project identity formation. In line with the findings of Huemer *et al.* (2004), a period of intensive search for joint meaning and a shared sense of purpose leads project actors to establish a common understanding of project collaboration. Following Ericksen and Dyer (2004), designing ways of working with multiple identities accelerates alliance team mobilization in the development of a collaborative identity. Although time pressures and project termination may negatively affect execution and participants' mindset (Nordqvist *et al.* 2004), the present findings suggest that by creating a cognitive illusion of continuous project identity, project actors are able to distance themselves from the scheduled end of collaboration. And although Saunders and Ahuja (2006) have proposed that managers should focus less on identity building for project organizations because of deadline pressures, the present findings suggest otherwise; a strong collaborative identity may be highly beneficial for project execution.

Team factors also have implications for collaborative project identity formation. When employees share an understanding of the criterion for selecting project participants, it reduces transactional uncertainty and enables the development of swift trust (Jones & Lichtenstein 2008), which supports organizational identity formation. Grabher (2002) found that swift trust is category-driven, in that trust building is based on the professional status of individuals. However, it seems that awareness of selected employees' abilities (e.g. ability to collaborate) can be more important than professional status in building trust in the organization. In contrast to identity formation in a permanent organization (Gioia *et al.* 2010), it seems that

attaining a shared mentality by engaging “the right kind of people” for the project is more important in a temporary organization setting.

The project organization is strongly motivated by task (Lundin & Söderholm 1995). Although a delimited, short-term task can create task orientation at the expense of interpersonal relations (Saunders & Ahuja 2006, Bakker 2010), it seems that in an alliance project, it is possible to achieve a balance between tasks and interpersonal relations, which strongly supports collaborative identity formation. Articulating a common system-level task is crucial for integrating actors and forming a collaborative project identity. Prior research on identity formation in permanent organizations has not established a connection between actor involvement and identity formation, but the present findings suggest that active involvement in task and goal definition strongly supports identification and identity formation in temporary organizations.

Context, the fourth concept associated with temporary organizations, also has implications for identity formation in alliance projects. In resolving issues of uncertainty, project teams usually exploit the social structures and institutional safeguards provided by their home organizations (Bakker 2010, Burke & Morley, 2016). However, in alliance projects, the need to create a collaborative project identity requires disengagement or decoupling from the home organization’s structures and principles. During identity formation in inter-organizational project organizations, multiple organizational identities can arise from diverse organizational, social and institutional backgrounds (Engwall 2003, Bakker 2010). The present findings suggest that co-location in the Big Room strongly supports the process of identification. As also indicated by prior research on dual organizational identification (Webber 2011), co-location facilitates embedding in the partner organization, helping to develop close relationships as well as supporting actors in overcoming organizational boundaries and their home organizational identities (Baiden *et al.* 2006). Beyond physical presence, mutually defined formal and informal practices and routines reinforce the shared feeling of “us” and help to deal with the issue of multiple identities.

4.1.3 Opportunity management

In the field of project management, opportunity management is known to facilitate innovation development, especially in large and complex projects, and strategies for promoting opportunities are likely to improve the probability of success (Lechler *et al.* 2012). However, research to date has not examined or articulated

concrete practices (Lechler *et al.* 2012, Lehtiranta 2014) to support continuous and active opportunity management over the project life cycle or how exploiting uncertainty might reveal opportunities. A broader perspective is therefore needed, integrating opportunity management activities at the project network level.

By analyzing an infrastructure alliance project, the present research was able to identify key opportunity management activities, and enablers of active and continuous opportunity management are also discussed. There is little existing research on the processes and practices of managing opportunities (Olsson 2007, Lechler *et al.* 2012, Lehtiranta 2014); most process models of uncertainty management concentrate on managing threats, and opportunity management approaches and processes remain mostly reactive (e.g. Hillson 2002, Ward & Chapman 2003). The factors found to affect the organization's ability to support active opportunity management in the present research align with the earlier findings of Lehtiranta (2014), Olsson (2007) and Ward and Chapman (2003). Competent, development-oriented people are central to creating a no-blame work culture and an integrated team; a project alliance clearly supports behaviors that improve collaborative organizational culture (Lloyd-Walker *et al.* 2014).

In addition to the enabling factors also identified in the existing literature, the present research identifies other elements that increase willingness to look proactively for opportunities. First, incentive and contractual arrangements reinforce the motivation for identifying and managing opportunities during the project. Walker and Jacobsson (2014) found that incentivization is a key motivator in the project alliance adoption—for example, individual and project-based incentives encourage and create a sense of ownership, both for the participating organizations and for individuals (Guo *et al.* 2014). Second, the existence of an idea-generating process significantly enhances active opportunity management. For example, a dedicated “tiger team” responsible for evaluating an idea (Pavlak 2004) enhances people's motivation to propose new ideas. Third, the degree of formalization in the opportunity management process has been identified as a salient enabler. Guo *et al.* (2014) found that control, flexibility and trust are basic mechanisms that can be built into project governance to eliminate uncertainty and complexity in organizational and environmental contexts.

The empirical findings here show that a mechanistic approach to processing opportunities supported the organization's quest for better opportunity management activities. This follows Bekefi *et al.*'s (2008) notion that it is critical to have a particular system for managing the process of developing ideas when pursuing opportunities. On the other hand, the present findings suggest that a mechanistic

process is not enough, as some flexibility is also needed. Similarly, scholars of risk management have recognized that balancing between control and flexibility is important for joint management of risks in a project organization (Osipova & Eriksson 2013).

4.1.4 Project alliance capability

In the research on project alliances, there are few empirical studies of the elements that contribute to an organization's success in bidding, managing and operating in alliance projects—that is, the elements constituting an organization's project alliance capability. Building on earlier research on project alliances (e.g. Lahdenperä 2012, Walker & Lloyd-Walker 2015), the general alliance literature within the field of strategy research (e.g. Kale & Singh 2007, Schreiner *et al.* 2009, Wang & Rajagopalan 2015) and the literature on project capability (Davies & Brady, 2000), the present research adds to knowledge about project alliance capability requirements for participating organizations.

First, the present findings concerning required skills align with prior research on success factors for project alliances (e.g. Love *et al.* 2010, Chen & Manley 2014, Jefferies *et al.* 2014). In addition, these findings extend Walker and Lloyd-Walker's (2015) suggestions for competence requirements that alliance managers need in order to meet organization-level project alliance capability requirements. However, present findings emphasize softer skills, such as an ability to reflect and bonding skills over business skills, which, on the other hand, are highlighted in Australian research on defining the competence requirements for alliance managers (Walker & Lloyd-Walker 2011). This may be explained by the contextual and the project delivery model's maturity differences in these two countries. A project alliance is still a new way of operating in Finland and people are in the learning mode. Second, the research on project alliance capability contributes to the general alliance capability literature by empirically investigating the skills and activities related to alliance capability throughout its life cycle. The significance of relational capabilities has been identified both here and in earlier research, and particular emphasis has also been placed on partner search (e.g. Wang & Rajagopalan 2015). However, in addition to partner search, the present findings of this thesis highlight the importance of identifying and selecting suitable individuals for the project, which is a novel insight that adds to the existing literature. These findings also suggest the importance of selecting the most suitable and committed individuals, as the project's timeframe makes demands on an organization's ability to mobilize

teams rapidly. Third, the present findings contribute to the literature on project capabilities by identifying key practices for success in bidding for and completing alliance projects within budget, on schedule and to unique customer specifications (Davies & Brady 2000).

4.2 Practical implications

Despite the increasing interest in project alliances and a number of completed alliance projects, organizations still seem unsure how to manage such projects or to build an environment that truly supports inter-organizational collaboration in a temporary project setting. First, organizations need a better understanding of the capabilities that the project alliance demands of participating organizations. Those with project alliance capability and an understanding of the requirements at both organizational and individual level can create a strong base on which to build a successful project network. Beyond the capability requirements for project-based organizations, little is known about the concrete collective managerial capabilities a project network needs for successful project execution.

Research on project alliance capability provides practical knowledge about the successful initiation and management of alliance projects. Project alliance capability comprises both the ability to implement key activities over the project life cycle and the skills required by project-based organizations and participating individuals. These activities not only create the basis for everyday project execution but are also targets for routinization and best practices that organizations can deploy from one project to another. Building routines is central to building organizational capabilities (Davies & Brady 2000, Söderlund 2005a). On the other hand, the identified skills indicate areas in which organizations should build and develop expertise in support of successful project implementation. As well as providing a basis for building project alliance capabilities, these findings can be of help in determining why some organizations are more successful than others in alliance projects.

Integration mechanisms facilitate management of inter-organizational integration, and these mechanisms can be seen as tools for practitioners in the management of alliance projects. As different projects require different levels of integration, the toolbox of integration mechanisms can support managers in tailoring a combination of integration mechanisms appropriate to each particular project. The findings here also suggest how best to manage integration during the project life cycle, as well as adjustments when new situations trigger changes in

integration requirements. It is useful to identify integration possibilities at different project stages, as task interdependencies and integration mechanisms change over a project's life cycle (Adler 1995). The likelihood of a successful project outcome is improved when managers acknowledge the need to strive for a balance between integration requirements and existing integration practices. Understanding that a project organization must be modified in response to changes in the project's environment, size, speed and complexity (Morris 2013) is essential. Here, it is suggested that integration capability in a project alliancing context requires adoption of a wide range of integration mechanisms, as well as the ability to adjust those mechanisms in response to everyday dynamics and emergent situations.

Knowledge about collaborative identity formation illuminates how managers can build a collaborative identity in a project context, and an understanding of the activities that affect collaborative project identity formation informs project leadership practices. Collaborative project identity indicates how organizational members collectively perceive and construct their organization, and this is a fundamental factor in relationship development. Voss *et al.* (2006) was among those who claimed that an organization's identity has a direct impact on success of that organization, highlighting the practical significance of this research theme. The present research offers practitioners ideas for building a collaborative project identity in temporary organizations. Identity formation differs between temporary and permanent organizations; in temporary organizations, implications of time and context seem the most significant issues for collaborative project identity formation activities. Although projects have time limits, project organization identity formation seems to benefit if managers can distance people from the idea of impermanence of collaboration. In addition, by actively searching and articulating the project's common goals and vision, it is possible to accelerate alliance team mobilization. The formation of collaborative project identity can also be enhanced by designing ways of dealing with multiple identities and disengaging people from the home organization's structures and principles.

Opportunity management research supports practitioners by supplying knowledge about practices that can be deployed during the project life cycle to improve opportunity management and make the process more efficient. The emphasis here is on the project's development phase, which is a fruitful period for developing opportunity management practices and putting them into action. Organizations within a project network may not be used to collaborating or looking jointly for better ways of operating or novel solutions. For this reason, the development phase is suitable for training and then implementing idea development

practices before actual execution of the project. Based on the present findings, it is suggested that opportunity management should form part of a project organization's central processes and should be integrated with other project management operations. To successfully manage opportunities, it is essential that the process is operationalized and becomes a daily practice. Concrete processes such as the idea generation process require control and flexibility. On the one hand, it is essential to have a clearly defined process to ensure that new ideas are properly analyzed and processed. However, overly mechanistic processes can hinder idea generation and therefore flexibility, and the use of multiple channels and occasions to share and generate ideas should also be built into the idea generation process. Activity and involvement are also central; by rooting practices in the organization as a whole, the probability of positive outcomes increases. In addition, managers need to focus on organizational support and commitment, as these are crucial elements in optimizing opportunity management.

4.3 Evaluation of the study

The validity and reliability of this research will be assessed using the criteria generally applied in evaluating qualitative research (Yin 2014): construct validity, internal validity, external validity and reliability. The limitations of the research will then be discussed.

Construct validity refers to the identification of correct operational measures for the concepts being studied (Yin 2014). The use of varied sources of evidence and data collection strategies (i.e. triangulation) (Jonsen & Jehn 2009) is one way of addressing the issue of construct validity in case research, as well as in qualitative research more generally (Yin 2014). The present research was based on single and multiple case studies and in-depth interviews—in other words, multiple data collection strategies were used. In addition, all the publications used multiple sources of evidence. In publications I and II, data collection was based on interviews and project-related documentation, as well as an observation of a lessons learned session. Publication III utilized interviews and project-related documentation. Publication IV drew on semi-structured in-depth interviews, but some complementary data sources were also deployed. A second tactic to evaluate construct validity is to establish a chain of evidence, which allows the reader to follow the derivation of any item of evidence from research question to case study conclusion (Yin 2014). In publications I, II, and III the quotes were utilized to support the empirical analysis and in publication IV, the quotes were used to

strengthen the discussion section. Here, all transcribed interview data were preserved to make it possible to trace the evidentiary process backward if needed. In addition, all project-related documentation was stored in a database. In all cases, the chain of evidence and research findings were supported by illustrative quotations. A third way of improving construct validity is by asking key informants to review the draft case study reports. Case study descriptions of both case projects were sent for review to the respective contact persons, and all the results (i.e. publications) were sent to informants for checking and comment prior to publication.

Internal validity concerns causal relationships, in which certain conditions lead to other conditions (Yin 2014). Internal validity is of concern in explanatory case studies when a researcher seeks to explain the logical reasoning that informs the findings (Yin 2014). In the present research, internal validity is of concern for publications I, II and III, as these are explanatory case studies targeting the reasoning behind integration dynamics, collaborative identity formation and opportunity management in alliance projects. General techniques to improve internal validity include pattern matching logic, explanation building, addressing rival explanations and using logic models (Yin 2014). Here, three publications dealt with alliance projects (publications I and II concerning the Liekki project; publications I and III concerning the Rantatunneli project) from different viewpoints, so improving internal validity. In particular, in publication I, replication across multiple cases (pattern matching) and highlighting the reasons underlying the integration dynamics (logic model) enhanced the study's internal validity. Overall, the internal validity of the dissertation research was improved by a double-blind review process, in which each publication was reviewed by members of the scientific community, and the research was then further developed in light of the feedback provided.

External validity defines the domain to which a study's findings can be generalized, regardless of the research method used (Yin 2014). External validity can be increased by defining the scope of the research carefully and by comparing the findings with previous research (Yin 2014). In this dissertation, the research boundaries were clearly defined by the focus on alliance projects. Using theory in single-case studies and replication logic in multiple-case studies are possible tactics for increasing external validity in case study research. The external validity of publication I is based on the replication logic of the two presented case studies. The other three publications (even though publication IV is not a case study) rely on analytical generalization from empirical findings to existing theories. In these three

publications, analytical generalization is based mainly on corroborating and advancing existing theoretical concepts and assumptions, but also on defining a new concept arising from the research.

Reliability addresses the extent to which a measure, procedure or instrument yields similar results on repeated trials (Eriksson & Kovalainen 2016). However, Yin (2014) has noted that emphasis should be placed on the same case and not on replicating the results of one case by conducting another. The aim is to minimize a study's errors and biases. Two tactics in particular have been proposed to enhance the reliability of the case studies: use of a case study protocol and development of a case study database (Yin 2014). For present purposes, the case study protocol was developed as a short guide (e-mail) containing information about the objectives of the research and the key topics to be covered in interviews, and by defining a list of questions to support the interviews. In addition, although semi-structured, all of the interviews were based on the same structure of key themes. With the exception of two interview sessions, at least two interviewers were present to improve objectivity. All data were recorded and transcribed to enhance reliability and stored in a case study database created for both case studies. In addition to interview transcripts, notes taken during the interviews and data analysis and other case study-related documents were stored in a database. For all the publications, the process of analysis informing research outcomes was described. Finally, to avoid any misunderstandings, interviewees were afforded an opportunity to check the analysis.

This research has some limitations. While case studies yield deep descriptions of the studied phenomena in a real-world context, theorizing from cases may result in narrow theory (Eisenhardt 1989). In case study theory building, the specifics of the data determine the theory's generalizability, so there is a risk that the result may be a description of a very idiosyncratic phenomenon that cannot be generalized beyond the immediate case context. In this dissertation, the number of case projects analyzed (two) can be considered low. However, in publication I, the research was conducted using the multiple case study method, which provides a stronger base for theory building than a single case study (Yin 2014). Undoubtedly, the single case study approach affects the generalizability of the findings. For example, in publication II, although it was evident that a project alliance supports the formation of collaborative project identity, the findings are not entirely generalizable to projects of other kinds.

In addition to single case study approach, also the empirical context affects the generalizability of the findings. The case projects were the first alliance projects

delivered in Finland and represented an in-mature and novel way of working of which no one had previous experience. Therefore it is reasonable to consider how much the research findings would have been different if this research had been conducted in some other country or industry. For example, when considering the content of project alliance capability (skills and activities), the need for particular business skills was not emphasized by the interviewees in the same way as in the studies conducted in Australia, where a project alliance is already a mature way of delivering projects. Therefore, although providing a fruitful environment for studying capability requirements for managing project alliances, the particular characteristics of the empirical context must be taken into account when generalizing the findings to alliance projects in other types of contexts.

Other weaknesses relate to data collection and the use of interviews as primary data. The data were collected retrospectively and may therefore be biased. To mitigate this weakness, the data were enriched by gathering supporting information from archival documents and by participating in a lessons learned session. In publication IV, the data were enriched by interviewing individuals with experience of several alliance projects beyond the case projects. To ensure the quality of the data, key actors with most experience of the project alliance were selected for interview. However, the number of interviewees was limited, and the primary data did not necessarily represent the views of people at grassroots level in the project organization. The data were also collected in a relatively short period of time; a longitudinal approach with active participation would have provided more detailed information about the key activities and processes over the alliance project life cycle.

4.4 Recommendations for further research

This dissertation provides new knowledge about the capabilities needed for managing project alliances in the infrastructure and construction industry. As a research context, the project alliance offers several possibilities for further research. While the research themes covered here have significant potential for further investigation, other interesting research perspectives and theoretical lenses could also be utilized to further deepen knowledge of project alliances.

In general, there are fruitful research opportunities for improving knowledge about the alliance project's life cycle and how it affects the management of alliance projects. More research is needed, for example, to examine the relationship between different integration mechanisms, integration requirements and phases of

the project life cycle; identity formation activities as a project develops; strategies supporting opportunity management in project organizations over the project life cycle; and capability requirements in different project phases. Indeed, improved knowledge about the project alliance life cycle (the dynamics of project alliance) and its effect on alliance project management could help to increase value-for-money in project alliances. Moreover, a life cycle perspective could also enable the development of models that describe the impact of time on managing projects and improve knowledge about dealing with temporality.

With regard to integration management in alliance projects, investigations of how project characteristics (e.g. number of alliance parties, location of the project) relate to the dynamics of integration mechanisms in use might improve understanding of the management of integration in practice. Studies of the fit between an organization's integration requirements and capacity could help in defining the best value-for-money combination of integration mechanisms and improve the efficiency of integration management in complex projects.

Organizational identity in a temporary organizational setting offers significant potential for further investigation, including more in-depth evidence on identity formation activities in terms of their interplay and possible overlap in a temporary organization context. In particular, to clarify identity struggles and their implications for identity dynamics, it would be useful to analyze projects in which events have challenged the organization's identity. The present findings suggest that the project organization was able to create a cognitive illusion of continuous project identity, so distancing people from the idea of impermanence of collaboration. It would be interesting to further explore this issue of continuity (also discussed by Bechky (2006) in inter-organizational project contexts. Additionally, other inter-organizational project contexts involving multiple conflicting identities would yield a better understanding of identity constitution in such settings.

Future research on innovation and opportunity management in project alliances and inter-organizational project settings should investigate in greater depth the types of strategy that might support the project organization in more fully integrating practices into uncertainty management and other management processes. In addition, it would be especially useful to further explore how benefit management and value management processes might enhance opportunity management processes through a longer-term perspective on identifying and seizing new opportunities. Similarly, research on the practicalities of extending opportunity management further into the supplier network would render the process

more active and continuous. In general, more research is needed on subcontractors' involvement in project alliances.

The present study defined the capability requirements for organizations participating in alliance projects; the next step would be to investigate how organizations build and develop project alliance capabilities. Knowledge integration seems a likely direction for research investigating how capability is built, both project-to-project and project-to-organization. More in-depth understanding of the relationship between activities and skills would support definition of the capability building process. In addition, future research should examine how project-specific and organization-level factors may affect project alliance capability as well as how the capability requirements may change after organizations and individuals have more experience of working in alliance projects.

With regard to methodology, a longitudinal approach to data collection (from strategy to defects correction phase) employing an active participative approach would provide more detailed information on the management of alliance projects. This would also enhance possibilities for studying the life cycle perspective, as well as the effect of time and temporality on project management. It will be important to study a wider range of projects delivered by the project alliance model in order to better understand the model's suitability and its characteristics in particular settings, as well as identifying the fundamental elements of project alliance across all industries and scales.

Current empirical evidence on alliance project performance and efficiency is limited. While there is some knowledge of the project alliance budget and schedule performance, more evidence is needed on this delivery model's efficiency and its impact on the industry, on people and on long-term customer benefits (e.g. using value management) with a view to enhancing current practices. A framework for analyzing alliance project performance and efficiency would also enhance practitioners' scope to develop the model further, as well as to evaluate project success.

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Appendix 1

Interviewees in the case projects. Interviewee's position in a project organization is marked as follows: member of an Alliance Management Team (AMT), member of an Alliance Leadership Team (ALT), and other member of an alliance organization (OMAO).

	The Liekki project	The Rantatunneli project
Client	<ul style="list-style-type: none"> - Assistant project manager, external communication (AMT) - Representative from the Finnish Traffic Agency (ALT) 	<ul style="list-style-type: none"> - Assistant project manager (AMT) - Representative from the Finnish Traffic Agency (ALT) - Representative from the city of Tampere (ALT)
Contractor	<ul style="list-style-type: none"> - Alliance project manager (AMT) - Design manager (AMT) - Person in charge of contractor (OMAO) 	<ul style="list-style-type: none"> - Alliance project director (AMT) - Person in charge of procurements (OMAO) - Person in charge of planning management (OMAO) - Person in charge of safety, quality control and risk management (AMT) - Person in charge of cost and schedule management (OMAO)
Engineering Agency		<ul style="list-style-type: none"> - Design manager (AMT) - Construction designer (OMAO) - Person in charge of communications and the environment (AMT)
Consultant	-Client organization's consultant (AMT)	

Original publications

- I Hietajärvi A-M, Aaltonen K & Haapasalo H (2017) Managing integration in infrastructure alliance projects: dynamics of integration mechanisms. *International Journal of Managing Projects in Business* 10(1): 5–31.
- II Hietajärvi A-M & Aaltonen K (2017) The formation of a collaborative project identity in an infrastructure alliance project. *Construction Management and Economics*. In Press.
- III Hietajärvi A-M, Aaltonen K & Haapasalo H (2017) Opportunity management in large projects: a case study of an infrastructure alliance project. *Construction Innovation: Information, Process, Management*. In Press.
- IV Hietajärvi A-M, Aaltonen K & Haapasalo H (2017) What is project alliance capability? *International Journal of Managing Projects in Business* 10(2). In Press.

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ISBN 978-952-62-1539-6 (Paperback)

ISBN 978-952-62-1540-2 (PDF)

ISSN 0355-3213 (Print)

ISSN 1796-2226 (Online)

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