Farooq Ali

A FRAMEWORK FOR ANALYZING, DEVELOPING, AND MANAGING STAKEHOLDER NETWORK RELATIONSHIPS IN COLLABORATIVE HOSPITAL CONSTRUCTION PROJECTS
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**Abstract**

The delivery of large hospital construction projects is challenging due to the involvement of a large number and variety of stakeholders working together in a complex and uncertain environment with diverging goals. Due to the environmental complexity and uncertainty of hospital construction projects, collaborative project delivery arrangements have been introduced to deliver such projects successfully. These collaborative arrangements do not guarantee collaboration among project stakeholders unless they identify shared project goals, align their interests to shared project goals, align their actions accordingly, and achieve a higher mutual understanding of their shared vision and goals, which is also challenging. Therefore, this study proposes a framework for properly analyzing the stakeholder environment and related networks, developing collaboration among stakeholders in that environment, and managing collaborative behavior among stakeholders in the context of hospital construction projects.

This research is based largely on a qualitative approach and partly on a mixed-methods approach by utilizing grounded theory and case study research strategies. The data collection methods adopted in this research include workshops, semi-structured interviews, surveys, and documentation. The findings of this study indicate that it is important to carefully analyze stakeholder networks and associated relationships at the healthcare process level and at the hospital project level. These networks and their types could influence the shared project goals and the coordination and control of stakeholders in a hospital construction project. In addition, the research findings show that stakeholders’ collaboration is not a stand-alone static process; it is a multilevel process that includes multiple activities related to cooperation, control, and coordination. The findings of this research also propose different mechanisms and related actions that could be adopted to limit opportunism and develop collaborative behavior among project stakeholders. This thesis presents a framework to address the above challenges and deliver successful hospital construction projects.

**Keywords:** collaboration, collaborative projects, complexity, control, cooperation, coordination, healthcare process level, hospital construction projects, hospital project level, opportunism, stakeholder networks, stakeholder relationships, uncertainty
Ali, Farooq, Viitekehys sidosryhmien verkostosuhteiden analysointiin, kehittämiseen ja hallintaan yhteistoiminnallisissa sairaalarakennusprojekteissa.
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Oulun yliopisto, PL 8000, 90014 Oulun yliopisto

Tiivistelmä
Suurten sairaalarakennushankkeiden toteuttaminen on haastavaa, koska mukana on suuri määrä ja erilaisia sidosryhmiä, jotka työskentelevät yhdessä monimutkaisessa ja epävarmassa ympäristössä, joilla on erilaisia tavoitteita. Monimutkaisen ja epävarmuuden sisältävä ympäristön takia sairaalarakennusprojektissa on viimeaikoina otettu käyttöön yhteistoiminnallisia toimitusmalleja. Yhteistoiminnallisuus ei yksistään kuitenkaan takaa hankkeen sidosryhmien välisiä yhteistyö-ä, elleivät he tunnista yhteisiä hankkeen tavoitteita, kohdista kiinnostuksen kohteitaan yhteisiin hankkeen tavoitteisiin, kohdista toimintaan sen mukaisesti ja saavuta yhteisymmärrystä yhteisestä visiosta ja tavoitteistaan, mikä on myös haastavaa. Edellisin perustuen tässä tutkimuksessa ehdotetaan viitekehystä sidosryhmien ympäristön ja siihen liittyvien verkostojen perusteelliselle analysoinnille, sidosryhmien välisen yhteistyön kehittämiselle kyseisessä ympäristössä ja sidosryhmien yhteistoiminnallisuuden hallintaan sairaalan rakennushankkeiden yhteydessä.


Asiasanat: epävarmuus, hallinta, koordinointi, monimutkaisuus, opportunismi, sairaalaprojektitaso, sairaalarakennusprojekti, sidosryhmäsuhteet, sidosryhmäverkostot, terveydenhuollon prosessitaso, yhteistoiminnalliset projektit, yhteistoiminnallisuus, yhteistyö
Dedicated to my parents, Ghulam Ali and Shamim
Akhter
Preface

This thesis has been written to fulfil the requirements to qualify for the degree of Doctor of Science (D.Sc.) at the Department of Industrial Engineering and Management, Faculty of Technology, University of Oulu.

I never thought about doing a doctoral degree as I was quite settled in Dubai, UAE. In my professional life, I have worked in Dubai’s construction industry for more than 18 years. I was involved in pre- and post-contract management, commercial management, quantity surveying, FIDIC & NEC negotiating, and problem-solving within the construction industry. I was fortunate to participate in various projects through different organizations (Contractors, Consultants, and Developers) with different roles (Project Commercial Manager, Contracts Manager, Quantity Surveyor, and Land Surveyor) in the construction industry.

The motivation to undertake doctoral study came from an interesting phenomenon observed during my professional experience in the industry, where I participated in a large residential, sports, and related infrastructure construction project that was procured through a collaborative project delivery arrangement (project partnering) for the first time in the history of the organization undertaking this project. During the front-end planning of the project, we were quite excited and confident that by adopting such a collaborative delivery arrangement, we could get rid of disputes and conflicts that we had been confronted with on other projects procured through traditional project delivery methods.

However, during the implementation phase of the project, we were again confronted with similar kinds of conflicts and disputes. From that point onward, I started thinking about the reasons behind this failure and why collaborative project arrangements are successful in Europe and Australia but not in Dubai. Therefore, I read the literature about collaborative projects and realized that there was a lack of knowledge and related capabilities within the project team (internal stakeholders) for managing collaborative projects. Moreover, there was an element of opportunism among project stakeholders due to their past experiences of undertaking construction projects through traditional delivery methods. Hence, there was a need to manage opportunism and develop stakeholder relationships to the desired level to participate in collaborative project delivery arrangements to achieve project success.

Thus, I would say that this was the starting point and motivation for my doctoral journey, which forced me to migrate from Dubai to Oulu, Finland, along with my family!
Acknowledgments

This thesis is the result of my full-time doctoral research that started in August 2019 after migration from Dubai to Oulu, Finland. First, I would like to express my sincere gratitude to my supervisor, Professor Harri Haapasalo, for allowing me to work as a full-time doctoral researcher in the Department of Industrial Engineering and Management (IEM), University of Oulu, and also for guiding and supporting me throughout my doctoral journey. Thank you, Professor Haapasalo: not only have you supported and guided me, but you have also been a true mentor during this process and especially during the unpredictable environment of COVID-19.

I am also grateful to my colleagues at IEM. Thank you, Associate Professor Kirsi Aaltonen, for arranging biweekly project business research seminars. These seminars provided great support for my research and studies. Thank you, Dr. Osmo Kauppila, for giving me the role of tutor teacher, related guidance, and support in many matters and for being a follow-up group member. Thank you, Senior Research Fellow Arto Reiman, for your guidance and support in chairing the follow-up group. Thank you, Associate Professor Jukka Majava, Senior Research Fellow Janne Härkönen, and others, for sharing your experiences and motivating me during my doctoral journey. Finally, Dr. Kari-Pekka Tampio and Dr. Petteri Annunen, both of you have been amazing. I don’t have words to describe it! I could not thank you enough for your support and motivation in almost everything.

I would like to thank the pre-examiners, Professor Derek H.T. Walker from RMIT University and Professor Kim Wikström from Åbo Akademi University for reviewing this thesis. I am also grateful to Professor Tuomas Ahola from Tampere University for acting as an opponent in the public defense of this thesis. This research would not have been possible without the support of the interviewees and their respective organizations in the Northern Ostrobothnia Hospital District. I am grateful to all the interviewees for sharing their project experiences, on which this thesis is based. During this doctoral research, I received additional scholarships that greatly supported this research project. Therefore, I would also like to express my sincere gratitude to the Tauno Tönning Foundation and the Riitta and Jorma J. Takanen Foundation for their financial support along this journey.

I also express my profound gratitude to my parents, my late mother Shamim Akhter and my late father Ghulam Ali, who passed away after I started my doctoral journey. He was there at the airport when my family and I left our home country. He was extremely happy with this initiative and said that it would be a proud moment for him to see me receive the doctorate. I cannot thank my parents enough...
for teaching me the value of education and hard work since childhood. Many thanks are also to my sisters Nighat, Riffat, Nazia, and Farah and my brothers Asad and Usman for their love and support.

Last but not least, my heartfelt thanks go to my wife Noureen Akbar, my son Muhammad Ali, and my daughters Zoha Fatima and Amna Ali for being with me throughout this journey. Without you, it would not have been possible for me to go through this arduous journey!

17th April 2023

Farooq Ali
Abbreviations and definitions

e.g. exempli gratia (for example)
i.e. id est (that is)
RQs Research questions
SNA Social network analysis
NOHD Northern Ostrobothnia Hospital District
RPDAs Relational project delivery arrangements
FO Focal organization
COS Conditions of satisfaction

The following key concepts are used throughout this thesis: stakeholders, project stakeholders, project alliance, collaborative hospital construction projects, healthcare process level, and hospital project level.

1. Stakeholders are individuals or groups who can affect or are affected by the project.
2. Project stakeholders typically include organizations directly involved in the activities of a project (internal stakeholders) and external stakeholders who are not directly involved in the project activities but could influence the project, e.g., government authorities, end users, and material suppliers.
3. A project alliance is an interorganizational entity formed to plan, develop, and deliver a construction project through a project alliancing delivery arrangement.
4. Collaborative hospital construction projects refer to procuring hospital construction projects through a relational project delivery arrangement.
5. The healthcare process level refers to the permanent organizations involved in the delivery and management of healthcare in primary health facilities, central hospitals, and university hospitals of northern Finland.
6. The hospital project level refers to the temporary organizations involved in the planning, development, and construction of a hospital project.
Original publications

This thesis is based on the following publications, which are referred throughout the text by their Roman numerals:


The author of this thesis is the first author in all original publications. He had been responsible for the entire research process that includes the formation of research problems and related research questions, the review of the related literature, the collection and analysis of empirical data, the preparation and submission of the manuscripts, and post-submission correspondence with the journals during the publication process. However, coauthors had played an important role in terms of participating in the design and planning of the studies. Furthermore, reviewing and commenting on the manuscripts during the preparation process. The exception is as follows: Tampio, K.P. collected the empirical data for Publication IV.
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1 Introduction

1.1 Background and research environment

The infrastructure projects of hospitals and utilities are usually delivered worldwide under conditions of high complexity and uncertainty due to the participation of a large number and variety of stakeholders (Sanderson et al. 2018; Fréchette et al. 2020) and their unpredictable requirements (Aaltonen & Kujala 2016). Complexity and uncertainty in these projects also arise because of technological innovation connected to future infrastructure, associated unrealistic project targets, interdependency, and dynamics of stakeholders due to their involvement in a large number of diverse activities (Glouberman & Mintzberg 2001; Eeckloo et al. 2007; Van Marrewijk et al. 2008; Elia et al. 2021). These challenges in hospital construction projects are also due to the introduction of new treatment processes and related medical technologies (Olsson & Hansen 2010). These conditions in such projects often lead to time and cost overruns (Flyvbjerg 2014).

Hospital construction project stakeholders typically include individuals, groups, owner organizations (permanent), and project organizations (temporary) that can affect or are affected by the project (Brugha & Varvasovszky 2000; Aaltonen et al. 2010; Sergeeva 2019). It has been argued that the input of stakeholders in decision-making is vital for an organization’s survival and development (Freeman 1984; Donaldson & Preston 1995). This is particularly relevant in healthcare organizations dealing with hospital construction projects due to the involvement of a considerable number of stakeholders and their expectations (Fottler et al. 1989; Rohini & Mahadevappa 2010).

Hospital construction projects and related stakeholders form a complex and vague social network where identification and mapping of stakeholders, identifying a common vision and goals on the permanent organization level (healthcare process level) and the temporary organization level (hospital project level), is challenging and requires a different approach to stakeholder relationship management (Wilson & Holt 2001; Zimmerman 2010; Aubry et al. 2014; Gupta et al. 2019; Fréchette et al. 2020). Furthermore, the challenges that exist in the stakeholder network at the healthcare process level are critical and must be identified and analyzed carefully to properly define the project concept (Williams & Samset 2010; Samset & Volden 2016) to avoid poor outcomes in hospital projects (Larsen et al. 2021a), which is not adequately explored in the healthcare project management literature. Due to
such complexities, some scholars have proposed the relationship approach to project stakeholder management for an in-depth understanding of the stakeholder interdependencies (Loosemore et al. 2020). This approach concentrates on the network of relationships, focusing on the relational aspects of project stakeholders, such as actors and their behaviors (Pryke 2005; Pryke et al. 2017).

The relationship approach adopts a social network perspective on projects to describe the network of stakeholders in a complex environment having multiple types of network relationships, such as contractual, supply, and information networks (Pryke 2004; Adami & Verschoore 2018). Traditionally, stakeholder relationships in projects are described with a diagram in which project stakeholders are linked with lines representing contractual relationships; however, this limited view of individual dyadic relationships among stakeholders does not reflect the complexity and dynamics of those relationships in different project stages (Pryke & Smyth 2006; Loosemore et al. 2020). To completely understand the interdependencies of stakeholders in different types of project networks, social network analysis (SNA) has been applied to capture the structural characteristics of stakeholder network relationships (Kim et al. 2011; Pryke et al. 2017; Adami & Verschoore 2018), but less attention has been paid to network relationships and their implications for the coordination and control of project stakeholders (Adami & Verschoore 2018) in collaborative hospital construction projects.

Due to various prevailing challenges of such complex construction projects, various initiatives have been launched since 1990, based on which the construction industry has started to move from traditional project delivery arrangements to relational project delivery arrangements (RPDAs), also known as collaborative projects (Walker & Hampson 2003; Dietrich et al. 2010; Lahdenperä 2012; Chen et al. 2012). RPDAs include project partnering, integrated project delivery, and project alliancing (Halttula et al. 2015; Walker & Lloyd-Walker 2015). Among them, project alliancing focuses more on relational aspects and contractually binds multiple project stakeholders (alliance partners) to work collaboratively toward mutual project goals (Davis & Love 2011; Jefferies et al. 2014; Haaskjold et al. 2020); it is generally adopted in large infrastructure projects (Walker & Lloyd-Walker 2016).

Complex and large projects procured through a project alliance demand more interorganizational cooperation, control, coordination, and collaboration (Pekkinen & Kujala 2014; Mellewigt et al. 2007; Romero-Torres 2020; Zhu et al. 2020). It has been argued that cooperation, control, coordination, and collaboration are at the core of stakeholder relationships in collaborative projects, but the meanings of
these concepts are not clear and they have been used interchangeably (Castañer & Oliveira 2020). This leads to the need to develop a framework that explains the meanings of these concepts, their interplay, and how they develop in terms of stakeholder relationships in collaborative projects.

It has been reported by several scholars that these conditions of complexity in large projects could lead the projects’ internal stakeholders to opportunistic behavior because of which they try to find opportunities to maximize their individual benefits rather than mutual project goals (Williamson 1993; Gil 2009; Gil et al. 2011; Lahdenperä 2017). For this reason, a range of mechanisms have been reported in the literature to limit opportunistic behavior and promote collaborative behavior among project stakeholders (Xue et al. 2017; Benítez-Ávila et al. 2018; Wang et al. 2021). Although collaborative projects (i.e., project alliancing) promote collaborative behavior among project internal stakeholders, the relational risk is the highest risk of a project alliance in case project internal stakeholders exhibit opportunistic behavior rather than collaborative behavior (Lumineau & Malhotra 2011; Eckhard et al. 2012; Galvin et al. 2021). Therefore, this thesis bridges these gaps by proposing a framework for analyzing, developing, and managing stakeholder network relationships in collaborative hospital construction projects.

1.2 Objective and scope

This thesis explores and discusses the stakeholder networks that exist at the healthcare process level and the hospital project level through SNA, the influence of these networks on the development of stakeholder relationships in terms of cooperation, control, coordination, and collaboration, and the management of these relationships in different phases of a collaborative hospital construction project. In particular, this thesis addresses the following research problem: What are the prerequisites and mechanisms for developing and managing stakeholder relationships in collaborative hospital construction projects?

The main objective of this research is to develop a framework for analyzing, developing, and managing stakeholder relationships in the context of a hospital construction project procured through a RPDA. This research integrates four original studies; the logical order and interaction of these studies are illustrated in Figure 1 and explained further below.
The aim is to first analyze the stakeholder network of permanent healthcare organizations and identify their challenges that were translated into a vision for such a project. Accordingly, the first original publication is on the healthcare process level. The second aim is to analyze the networks of project stakeholders, their types, and the implications of these networks for the coordination and control of project stakeholders. Therefore, the second original publication is on the hospital project level. The third aim is to clarify interorganizational cooperation, control, coordination, and collaboration requirements and preconditions to project internal stakeholders. Thus, the third original publication is related to the development of relationships in terms of the cooperation, control, coordination, and collaboration of stakeholders. The fourth and final aim is to identify different mechanisms and related actions that could allow the project alliance to develop collaborative behavior among project internal stakeholders and limit opportunism. Hence, the fourth original publication is related to managing opportunism in stakeholder relationships.

This research addresses four research questions (RQs) that relate to the aim and objective of this thesis, as presented in Table 1. The position of RQs within the research framework is illustrated in Figure 1.
Table 1. Research questions of the thesis.

<table>
<thead>
<tr>
<th>RQ#</th>
<th>Research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ1</td>
<td>What are the challenges of stakeholder network in the healthcare process of northern Finland?</td>
</tr>
<tr>
<td>RQ2</td>
<td>What are the types of stakeholder networks that exist in collaborative hospital construction projects and their implications for the coordination and control of project stakeholders?</td>
</tr>
<tr>
<td>RQ3</td>
<td>What are the levels and preconditions for developing stakeholder relationships in collaborative hospital construction projects?</td>
</tr>
<tr>
<td>RQ4</td>
<td>What are the mechanisms and related actions for managing collaborative relationships in hospital construction projects?</td>
</tr>
</tbody>
</table>

The focus of this thesis is on analyzing the stakeholder networks on the healthcare process and project levels, how these networks influence stakeholders’ collaborative relationships, developing collaboration among project stakeholders, and managing it in different phases of a collaborative hospital construction project. This thesis includes four separate original publications (Table 2) that contribute to the main objective of this research.

Table 2. Overview of research articles.

<table>
<thead>
<tr>
<th>Article</th>
<th>RQ#</th>
<th>Article title</th>
<th>Journal</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>RQ1</td>
<td>Analysing the challenges in stakeholder relationship management in the healthcare process: a social network perspective</td>
<td>International Journal of Networking and Virtual Organisations</td>
</tr>
<tr>
<td>II</td>
<td>RQ2</td>
<td>Analysing the stakeholder networks in collaborative project using network theory: implications for coordination and control</td>
<td>International Journal of Project Organisation and Management</td>
</tr>
<tr>
<td>III</td>
<td>RQ3</td>
<td>Development levels of stakeholder relationships in collaborative projects: challenges and preconditions</td>
<td>International Journal of Managing Projects in Business</td>
</tr>
<tr>
<td>IV</td>
<td>RQ4</td>
<td>Managing opportunism in stakeholder relationships: case of a hospital construction project alliancing</td>
<td>Manuscript submitted for publication</td>
</tr>
</tbody>
</table>

1.3 Research philosophy and approach

Scientific research always starts with philosophical perspectives or beliefs. These philosophical beliefs are also known as the worldviews of the researchers. A philosophical belief contains two major elements: ontology and epistemology
Ontology talks about the state of being or reality, where some researchers say that there is a single social reality out there, and we can or cannot research it. However, there are also others who would say that there are multiple social realities out there. So, if one assumes that there is a single social reality out there and that it is independent of social actors, this belief is called objectivism. In contrast, if one believes that there are multiple social realities created by social actors, it is called constructivism (Saunders et al. 2012). The third belief is pragmatism, according to which social phenomena are there only insofar as they work, and researchers focus on the research problem and find out what works as a solution; instead of focusing on one single approach, they use multiple approaches to understand the problem (Creswell 2009).

Epistemology talks about what knowledge is and how we gain knowledge. If there is a reality out there, as we would discuss in ontology, we now pose the question, that is, how can we understand reality? Or can we understand reality, or do we need to measure reality? Accordingly, there is a distinction between a positivist view, which is objective, and a more interpretivist view, which is subjective. The core of positivism is that we can apply natural science methods to the social sciences, which means all the knowledge we gain, we gain it through the senses. Thus, everything should be observable and measurable. According to an interpretivist epistemology, social reality has a specific meaning and relevance structure for the beings living, acting, and thinking within it. People interpret the world out there; the focus lies on the meaning of social action, trying to understand subjectively (Bryman 2012).

Besides research philosophies, there are different research approaches to conducting research, such as qualitative, quantitative, and mixed-methods research approaches. Philosophical beliefs help researchers explain why a particular research approach has been adopted to conduct the research. For example, the qualitative approach can be described as a means of understanding human behavior and the meanings they assign to social reality. This approach is concerned with words rather than numbers, and it is broadly related to constructivism (interpretivism). The quantitative approach can be described as a means for testing objective theories by examining related variables and their relationships, collecting numerical data, and performing associated statistical procedures that favor the natural science approach (positivism). The mixed-methods approach combines both qualitative and quantitative approaches by complementing one approach with another to obtain an in-depth understanding of the research phenomenon that is related to pragmatism (Creswell 2009; Bryman 2012).
The philosophy and approach of this research is illustrated in Figure 2. It is based largely on the principles of constructivism and partly on pragmatism. One original publication (II) adopts a mixed-methods research approach in which both qualitative and quantitative research approaches are used by complementing quantitative research with qualitative methods, which leads to pragmatism. The remaining three original publications (I, III, and IV) are qualitative in nature, broadly related to constructivism and interpretivist epistemology. The research strategies and methods adopted in the original publications are explained in more detail in Section 1.4.
1.4 Research strategies and methods

This thesis is based on four original publications. The first publication followed a grounded theory research strategy or methodology (Glaser & Strauss 1967; Creswell 2009). This research strategy was selected because we aimed to conceptualize the healthcare process of northern Finland by generating concepts through induction that explains the operational challenges in the healthcare network and how they impact stakeholder relationships. Consequently, data were collected through workshops and semi-structured interviews (Table 3) and analyzed inductively. Respondents were selected based on their professional background and their various roles in their organizations to achieve multiple perspectives on the research phenomenon. The context of this study is the Northern Ostrobothnia Hospital District (NOHD), which is a hospital district. NOHD is owned by 29 member municipalities located in northern Finland.

Publication II explores and elaborates on stakeholder network relationships in a hospital construction project composed of two contractually separated alliance subprojects by using a concurrent mixed-methods research strategy (Creswell 2009). This strategy was adopted to explore the structural characteristics of different types of stakeholder networks and their implications for the coordination and control of project stakeholders. Therefore, we used both quantitative and qualitative data collection methods. We organized a survey for quantitative data collection that was used for SNA and sociogram–network diagram preparation (Borgatti et al. 2018) to illustrate the structure of stakeholder networks in the alliance subprojects. Qualitative data were collected through semi-structured interviews (Clifford et al. 2016) and examined with qualitative content analysis (Duriau et al. 2007; Malterud 2012) through NVivo to develop an in-depth understanding of the stakeholder network relationships and their implications. To enable triangulation (Creswell 2009; Oyegoke 2011), data analysis findings were also validated through alliance contract documentation.

Publication III explores the multilevel process of stakeholder collaboration in the context of a collaborative hospital construction project by using a case study research strategy (Creswell 2009) to identify the challenges in developing collaborative relationships among project stakeholders and propose preconditions for developing stakeholder relationships in collaborative settings. Semi-structured interviews (Denzin & Lincoln 2005; Clifford et al. 2016) were conducted for data collection, and a directed approach of qualitative content analysis (Hsieh & Shannon 2005) was applied to the empirical data.
Publication IV explores the issue of opportunism in construction projects and proposes mechanisms and related actions to develop collaborative behavior and limit opportunism between project stakeholders in different phases of a collaborative hospital construction project. This case study involves data collection through semi-structured interviews and analysis through systematic text condensation (Malterud 2012). The research strategies and data collection methods adopted in the original publications are summarized in Table 3.

<table>
<thead>
<tr>
<th>Article</th>
<th>RQ#</th>
<th>Research strategy</th>
<th>Data collection method</th>
<th>No. of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>RQ1</td>
<td>Grounded theory</td>
<td>Workshop and semi-structured interviews</td>
<td>11 + 11</td>
</tr>
<tr>
<td>II</td>
<td>RQ2</td>
<td>Concurrent mixed methods</td>
<td>Survey, semi-structured interviews, and</td>
<td>71 + 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>documentation</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>RQ3</td>
<td>Case study</td>
<td>Semi-structured interviews</td>
<td>14</td>
</tr>
<tr>
<td>IV</td>
<td>RQ4</td>
<td>Case study</td>
<td>Semi-structured interviews, and</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>documentation</td>
<td></td>
</tr>
</tbody>
</table>

1.5 Thesis outline

This thesis is based on four original publications that are briefly described in Section 1.2, reprinted, and included in the printed version of this thesis. This thesis consists of four chapters that connect the relevant literature and findings from the original publications to make a larger contribution to the research phenomenon than each original publication’s contributions. The first chapter introduces the background and research environment that explain how the thesis ideas were developed. It also outlines and explains the objective and scope, research philosophy and approach, research strategies, and methods used in this research.

The second chapter describes the theoretical framework of this thesis, which illustrates the scope of the thesis in terms of the relevant theoretical areas and literature streams applied in this research. The third chapter discusses the research contributions of each original publication, providing its background and summary of the research findings. It also provides a synthesis of the research findings, which provide answers to the research questions of this thesis. The fourth chapter discusses theoretical and practical implications and critical evaluation of the research, which addresses research validity and reliability. Finally, recommendations for further research are presented.
2 Literature review

2.1 Theoretical framework

The theoretical framework of this thesis is based on five main areas that include different theories and literature streams: stakeholder approach, network theory, RPDAs, perspectives of interorganizational relationships, and assumptions of behavior in transaction cost economics (Figure 3). These theories and streams are adopted to get a better understanding of the research phenomenon, which is related to analyzing, developing, and managing stakeholder relationships in hospital construction projects procured through a RPDA.

In Section 2.2, a literature review related to stakeholder approach (Freeman 1984) describes this concept and its background in detail. In addition, it relates this concept to the project management (Cleland 1986) discipline and outlines the related research on project stakeholder management (Donaldson & Preston 1995; Aaltonen et al. 2008; Aapaoja & Haapasalo 2014; Dansoh et al. 2020), stakeholder identification and mapping (Mitchell et al. 1997; Olander 2007; Harrison et al. 2019), and stakeholder relationships and environment (Martinsuo & Lehtonen 2009; Aaltonen & Kujala 2016). In this research, perspectives of business and strategic management, social welfare, public policy, and law within the stakeholder approach have been excluded due to the nature of the research phenomenon (Miles 2019; Bosse & Sutton 2019; Jones & Harrison 2019; Bhattacharya & Korschun 2019).

To analyze the stakeholder relationships in collaborative hospital construction projects due to the multiplicity of stakeholders’ involvement, the stakeholder approach is complemented with network theory (Section 2.3) to gain a better understanding of the patterns of stakeholder relationships and their possible influence on the project outcomes (Rowley 1997; Loosemore et al. 2020). Accordingly, perspectives of SNA (Pryke 2004; Scott 2017; Borgatti et al. 2018) and project networks (Pryke et al. 2017; Adami & Verschoore 2018; Klessova et al. 2020) are included in this research to gain a basic understanding of stakeholder networks and related interdependencies (Mok et al. 2017a). Therefore, issues related to normalization, eigenvector centrality, beta centrality, closeness centrality, and betweenness centrality are not included (Borgatti et al. 2018).
Fig. 3. Theoretical framework.

Perspectives of interorganizational relationships
- Interorganizational cooperation
- Interorganizational control
- Interorganizational coordination
- Interorganizational collaboration

Stakeholder approach
- Stakeholder definition
- Project stakeholder management

Analyzing, developing, and managing stakeholder relationships
- Social network perspective
- Social network analysis
- Project networks

Peripheral project delivery arrangements (RPDA)
- Definition
- Types of RPDA
- Phases of project alliancing
- RPDA's comparison
- Contractual arrangements
- Commercial arrangements
- Organizational demand structures

Assumptions of behavior in transaction cost economics
- Opportunistic behavior
- Mechanisms for limiting opportunism
- Boundedly rational behavior

Within study scope
Out of study scope
The context of this research is a hospital construction project procured through project alliancing (contract model), which is one of the RPDAs. Therefore, it is important to include relevant literature related to RPDAs in this research, such as different types of RPDAs and phases of project alliancing (Lahdenperä 2012; Walker & Lloyd-Walker 2016; Pargar et al. 2019; Haaskjold et al. 2020; Manata et al. 2021). However, topics related to comparison of RPDAs, contractual and commercial arrangements, and organizational and structural issues are not included in this study (Ross 2003; Lichtig 2006; Lahdenperä 2012) as the focus of this research is not on these issues.

Projects procured through RPDAs are impacted by the level of stakeholders’ cooperation, control, coordination, and collaboration. Therefore, it is necessary to define these concepts and explain the interplay between them in terms of stakeholder relationships. This research applies the perspectives of interorganizational relationships in terms of cooperation, control, coordination, and collaboration among stakeholders (Parkhe 1993; Weber et al. 2011; Gulati et al. 2012; Kretschmer & Vanneste 2017; Castañer & Oliveira 2020).

In such projects, behavior plays an important role in developing and maintaining collaboration among stakeholders. It is important to stay away from opportunistic behavior that could lead to adversarial relationships among stakeholders. Therefore, this research includes the literature concerning assumptions of behavior in transaction cost economics and discusses the opportunistic behavior and mechanisms for limiting such behavior in detail (Williamson 1993; Gil 2009; Eriksson-Zetterquist et al. 2020; Van der Krift et al. 2021; Wang et al. 2021). Boundedly rational behavior has been excluded from the discussion (Eriksson-Zetterquist et al. 2020) due to its irrelevancy as the focus of this research is on developing and managing collaborative relationships among project stakeholders.

### 2.2 Stakeholder approach

The stakeholder approach emerged in the 1980s as a new conceptual framework and ideas that view the firm as a value-creation mechanism not only for its owners and shareholders but also for stakeholders who have legitimate interest in the activities and results of the firm (Freeman 1984; Harrison et al. 2019). Later, stakeholder thinking was introduced in the project management paradigm and emphasized the importance of project stakeholders and their nature of interest regarding a project (Cleland 1986).
There has been a debate on the definition of stakeholders. Freeman's (1984) classic definition that 'any group or individual who can affect or is affected by the achievement of organization objectives' has been considered broad. However, the definition used in the Stanford memo that 'those groups without whose support the organization would cease to exist' has been viewed as narrow (Mitchell et al. 1997; Olander 2007). Furthermore, it has also been stated that stakeholders are those who have a stake in the organization, and they contribute to the organization accordingly; therefore, they are beneficiaries and/or risk bearers (Post et al. 2002).

These broad and narrow views can also be observed in the definitions of project stakeholders. Project management institute (PMI) has followed the Freeman's (1984) definition; individuals and organizations that are actively involved and can affect or are affected by the project’s objectives are project stakeholders (Aaltonen et al. 2008; Aaltonen et al. 2015). McElroy & Mills (2000) view is narrow like Post et al. (2002), an individual or group who has a vested interest in the outcomes of a project are project stakeholders (Aaltonen et al. 2015). Here, the term 'vested interest' can be viewed as 'stake', which could be defined as benefits or risks associated with organization or project activities (Olander 2007).

Accordingly, some actors may have stake and influence in the organization while others may have only either of them, the ones who have stake are defined as stakeholders and who have influence only are defined as influencers (Donaldson & Preston 1995). Based on which Olander & Landin (2005) state that since media has no stake in the project or organization, therefore, media cannot be considered as a stakeholder. Subsequently Olander (2007) states that this view is problematic because media has influence and can have huge impact on the project activities. Though influencers have no legitimate claims, but they have power to influence the project decisions. Sometimes power and legitimacy can have overlapping dimensions, therefore, they are considered as core attributes in stakeholders’ identification and by adding a dynamic attribute of urgency the model of stakeholder identification completes (Mitchell et al. 1997).

Thus, we can define a project stakeholder as an individual or group who has a stake in the outcomes of a project and the environment within which it operates (Olander 2007), can contribute in any form or can impact or impacted by the project (Aapaoja & Haapasalo 2014).
2.2.1 Project stakeholder management

Projects are executed by coalitions of multiple stakeholders and are implemented in complex and demanding environments where each stakeholder has its own requirements and interests (Aapaoja & Haapasalo 2014). To satisfy their interests, stakeholders often apply strategies that are aligned with their specific objectives to affect project decision making (Mok et al. 2015). The stakeholder management primarily focus on project managerial decision making (Donaldson & Preston 1995) from the perspective of a focal organization. However, considering the stakeholders’ perspective can enhance understanding of stakeholders and their management (Aaltonen et al. 2008).

As sometimes stakeholders’ varied interests can lead to the pursuit of goals that are not aligned with project objectives, therefore, it is important for project managers to consider the interests of all stakeholders irrespective of whether they are internal or external (Dansoh et al. 2020). The complex and dynamic nature of construction projects demand project managers to understand the interests and expectations of stakeholders concerning the project (Bourne & Walker 2005). Regardless of how well you define your project time, cost, and quality objectives, poor management of project stakeholders may cause project failure (McElroy & Mills 2000). The solution of such failures lies in finding better ways for dealing with project stakeholders and improving the related management practices (Eskerod & Jepsen 2016).

Project stakeholder management is often conceived voluntarily without premediated coordination efforts by the project team that leads to unpredictable challenges (Cleland 1986; Jiang et al. 2002). Inadequate stakeholder management could lead project managers to achieve project goals that were not intended by the stakeholders (Meredith & Mantel 2000; Karlsen 2002). It has been argued that successful projects establish efficient stakeholder management by taking into account the needs and requirements of project stakeholders (Olander & Landin 2005; Aaltonen & Sivonen 2009). However, project stakeholders have their individual goals, interests, and expectations that may vary due to the complexity of the project environment, which requires careful attention of project managers to align stakeholders’ individual goals with shared project goals (Artoo et al. 2008a).

The emphasis is on the importance of stakeholder’s identification, classification, analysis, and management approaches (Cleland 1986). It is important to categorize stakeholders based on their involvement and role in the project organization; the nature of their claims and position towards the project.
organization (Beringer et al. 2012). Hence, project stakeholder management includes the processes of stakeholder identification, analyzing their expectations, interests and impact on the project, and developing strategies for effective stakeholders’ engagement in project decisions (Francisco de Oliveira & Rabechini 2019) as well as managing relationships among stakeholders (Aaltonen & Kujala 2010).

2.2.2 Stakeholder identification and mapping

The economic importance of stakeholders have grown interests in theories that enable to identify stakeholders in any given organization (Harrison et al. 2019). In accordance with one approach, three attributes emerge from the stakeholder literature that help to identify different classes of stakeholders that are salient in the eyes of management team in certain respect (Mitchell et al. 1997). Stakeholders can be identified and classified into distinct categories based on the possession of one, two, or all three attributes (Olander 2007). The first attribute is power, it can be defined as the stakeholder’s ability to mobilize and control the project resources (Karlsen 2002). The stakeholder’s power can arise from their ability to withdraw resources from the project (Post et al. 2002). There are many forms of power; it can occur based on the structure of the project network and stakeholder’s position in the network (Aaltonen & Kujala 2010; Aapaoja et al. 2013).

The second attribute is legitimacy, it can be defined as social good, that the actions of the stakeholders are appropriate according to the system of the best practices or standards (Mitchell et al. 1997). Project managers are usually more willing to pay attention to stakeholders who have legitimate demands (Aapaoja & Haapasalo 2014; Kinnunen et al. 2014; Aaltonen et al. 2015). Stakeholders’ legitimacy arises from a contractual, legal, or moral rights and interests as well as at risk situations generated by the firm’s actions (Lähdesmäki et al. 2019). The third attribute is urgency, it refers to the time sensitivity and criticality of the stakeholder’s demands that is how quickly a project manager should address the demands and how important it is for the other stakeholders (Mitchell et al. 1997; Aaltonen et al. 2008) as well as for the entire project. Time sensitivity refers to the degree to which a managerial delay, in attending to the demand, is unacceptable to the stakeholder, and criticality refers to the importance of the demand of the stakeholder (Aaltonen et al. 2008; Aapaoja et al. 2013; Aaltonen et al. 2015). According to Olander & Landin (2005), urgency can be considered as an interest of the stakeholder, such as; in the construction industry any factors that can have
negative consequences to the project objectives can increase the urgency of the demands.

Salience refers to the importance of stakeholder demands to which managers give priority. The salience framework developed by Mitchell et al. (1997) classifies stakeholders according to their possession of the number of attributes, therefore managers perceive the power, legitimacy and urgency of stakeholders’ claims (Aaltonen et al. 2015). Stakeholder’s typology with respect to their importance to management can be formed by combining these attributes. Hence, the salience framework predicts the stakeholders who are salient in the eyes of the management (Aaltonen et al. 2008; Lähdesmäki et al. 2019).

Another commonly accepted approach to stakeholder identification is to classify them into internal and external stakeholders. The formal members who are actively involved in the project and control the resources are internal stakeholders. Whereas, the other informal members who have no direct control over the resources are external stakeholders, but they may also influence the project positively or negatively (Cova & Salle 2005; Aaltonen & Kujala 2010; Aapaoja et al. 2013). Fottler et al. (1989) proposed a third category of interface stakeholders especially for hospital projects to identify the ones (i.e., medical staff) who operate between the internal and external stakeholders due to their broader role of interacting across boundaries. Winch (2004) categorizes stakeholders into opponents and proponents based on their nature of demands and emphasizes on the part of stakeholder management to find ways of converting opponents to proponents by offering appropriate solutions.

They are also referred to and categorized as primary and secondary stakeholders; all internal stakeholders who are formal members of the project coalition can be called primary stakeholders as such stakeholders have contractual relationship with the focal organization. The ones who are not formal members of the project coalition and have no contractual relationship with the focal organization are called external or secondary stakeholders (Eesley & Lenox 2006; Atkin & Skitmore 2008; Aaltonen et al. 2015). However, scholars have devoted most of their efforts to the management of internal stakeholders, and it has been evident that due to the project’s limited resources, the concerns of all potential stakeholders cannot be addressed, but the most relevant claims come from internal stakeholders (Aaltonen & Kujala 2010).

Various stakeholder mapping techniques are available such as power/interest matrix presented by Johnson & Scholes (1999) which evaluates the interest of each stakeholder and their relative power to impose their expectations on the project.
The same has been adopted by Olander (2007) by changing the axis of interest to instead measure the probability of impact (X-axis) and changed the axis of power to measure the level of impact (Y-axis) as it was hard to measure power and interest on the scale, thus formulated the impact/probability matrix. However, in hospital projects, stakeholders are generally divided into three predefined categories that are internal, interface, and external stakeholders, and accordingly they are mapped (Fottler et al. 1989; Dansky & Gamm 2004; Rohini & Mahadevappa 2010).

2.2.3 Stakeholder relationships and environment

The advancement of stakeholder theory has concentrated on two related streams: (1) the core concept of stakeholders and (2) the categorization of stakeholders into different groups in order to propose an understanding of their specific relationships (Donaldson 1995). Apart from focusing on specific stakeholder relationships, it is also important to consider the environment of stakeholders, as it may also influence the relationships among stakeholders (Rowley 1997; Chekkai et al. 2013). As organizations respond to interactions of multiple stakeholders present in the environment and each organization faces a different environment, thus, a different set of stakeholders and their interdependent relationships (Rowley 1997).

The project environment is defined by Youker (1992) as the combination of surrounding events, conditions and their influences. Furthermore, uncertainty because of relationship dependency between the project and its environment. Burton & Obel (2003) used the contingency factors of complexity, uncertainty, and equivocality for describing the project environment; and how these factors make stakeholder relationship management difficult. The relationship management of stakeholders need to balance opposing demands on resources between different elements of the project, and between the implementation of project activities and new technology (Bourne 2005; Misser et al. 2020), but uncertainty and complexity within an environment makes this balance difficult to achieve (Turner & Müller 2003).

Studies on the healthcare sector have recognized that healthcare organizations grow in a chaotic environment which is characterized by continuous change and varying demands in terms of quality, cost efficiency and health information exchange from various stakeholders (Kumar & Subramanian 1998; Rohini & Mahadevappa 2010; Wetering & Versendaal 2020). This indicates that hospital project managers are encountered with an uncertain environment with varying demands from multiple influential stakeholders (Rotarius & Liberman 2000).
Accordingly, project managers must respond to and engage with these influential stakeholders (Kumar & Subramanian 1998) and must distinguish them into different groups to understand the type of their relationship with the organization (Rohini & Mahadevappa 2010) and how to manage such relationships.

Complex and uncertain stakeholder environments create variety of challenges for projects. In order to reduce such challenges, project managers analyze stakeholders to build up picture of the stakeholder environment to ensure the informed and careful decision making in the project (Aaltonen 2011). The project management literature has not defined the concept of project stakeholder environment unanimously (Artto et al. 2008b; Martinsuo & Lehtonen 2009). Aaltonen (2011) defines the project stakeholder environment as the interorganizational relationship network that can affect or be affected by the project. Later, Aaltonen & Kujala (2016) describes “project stakeholder environment through the concept of project stakeholder landscape” with four key dimensions comprising complexity, uncertainty, dynamism, and institutional context.

Complexity can be defined as a set of interconnected elements in a system (Simon 1962). Jacobs & Swink (2011) define complexity as a state which demonstrate the diversity and interrelatedness of system elements. The notion of complexity has been described with multiple attributes, dimensions, and factors, Choi et al. (2001) describes complexity with three attributes which are number, variety, and interdependence of components. Aaltonen & Kujala (2016) divide complexity dimension into stakeholder element complexity and stakeholder relationship complexity. The stakeholder relationship complexity is closely related to the relationship networks in projects, and it includes the following sub-factors: (1) number of relationships among stakeholders, (2) variety of relationships, (3) patterns of relationships, (4) relationships’ internal complexity, (5) external stakeholder relationships.

Within project management literature uncertainty relates to the project risks, whereas within complexity theory it relates to the current and future states of the system’s elements and their interaction (Geraldi et al. 2011). Uncertainty includes four sub-factors: (1) lack of information related to stakeholders and their relationships, (2) project management’s experience with respect to stakeholders and stakeholder analysis, (3) analyzability of the stakeholder environment, (4) ambiguous information concerning stakeholders (Jepsen & Eskerod 2009; Aaltonen 2011; Walker et al. 2014; Martin 2015; Mok et al. 2015).

Dynamism can be defined as a system’s tendency to change, and it is a fundamental property of complex systems. Dynamism includes six sub-factors: (1)
changes in stakeholders’ attributes, (2) changes in stakeholders’ position, (3) changes in relationships among stakeholders, (4) emergent stakeholders and relationships, (5) changes in appropriate ways of engaging stakeholders, (6) changes in stakeholders’ influence strategies (Artto et al. 2008b; Beringer et al. 2013; Missonier & Loufrani-Fedida 2014; Aaltonen et al. 2015).

Institutional context refers to the institutional environment within which projects exist and it demands and influences the project organization and the way projects are carried out, sometimes projects shape their institutional contexts (Miller & Lessard 2001; Orr & Scott 2008). Institutional context includes five sub-factors: (1) stakeholders’ local embeddedness, (2) legitimized structures and processes for stakeholder engagement, (3) the nature of stakeholders’ legitimized influence strategies, (4) multiplicity of institutional environments, (5) complexity of the stakeholders’ interpretation process (Aaltonen & Kujala 2016).

2.3 Network theory

The social network theory improves understanding of the role of individual stakeholders in a network and how patterns of their relationships influence project outcomes (Pryke et al. 2017; Loosemore et al. 2020). Relationships in a network not only has dyadic ties between a focal organization (FO) and stakeholders, but stakeholders may also have direct relationships with each other (Rowley 1997; Chekkai et al. 2013). Freeman (1984) model presented FO at the center of the network of relationships with other stakeholders.

A stakeholder network contains multiple patterns of relationships, such as FO at the center of several dyadic relationships with stakeholders (Graph 1 – Figure 4), FO in a network of multiple relationships (Graph 2), FO in a network of multiple sets of relationships (Graph 3), and FO that falls between two stakeholders (Graph 4) (Rowley 1997). Graph 3 (Figure 4) could also be observed as different groups of stakeholders connected through central nodes (A, E, D, C, B) and a critical node (FO) where central nodes relate to their own groups and critical node. The removal of any one central node would not result the maximum network disintegration as it is not the unique connector. Whereas the removal of critical node would cause maximum disintegration of the network (Chekkai et al. 2013).
Fig. 4. Patterns of relationships (Reprinted from Publication I © 2022 Inderscience Enterprises Ltd.).

### 2.3.1 Social network perspective

In this perspective, the focus is on stakeholders’ network to propose an understanding of their individual relationships and how they influence FOs (Donaldson 1995: Rowley 1997) and the exchange of value between a FO and
stakeholders (Harrison et al. 2019). Rowley (1997) argues that a complete theory requires not only an explanation of how stakeholders influence FO but also how FO influence stakeholders and respond to each other’s demands.

According to Pryke (2004), all organizations are social networks, and they are suspended in complex networks of relationships, and it is unlikely to observe the overall pattern from the perspective of one organization. In Rowley’s (1997) study, the density of the stakeholder network and the centrality of the FO are considered important factors in managing relationships among stakeholders. Accordingly, it has been stated that as the number of relationships grow, a network becomes denser, and it becomes challenging for the FO to withstand pressures from the stakeholders, and they are more likely to form coalitions because of their shared expectations (Aaltonen & Kujala 2016). However, a denser network creates more challenges in terms of managing stakeholders if the goals of the stakeholders are not aligned with the shared project goal, but if the dense network is formed by the alliance partners with aligned goals, then it is helpful in achieving the project objectives and managing stakeholders (Aaltonen et al. 2010).

Furthermore, the interdependencies between stakeholders with regards to information exchange and related concerns contribute to project complexities (Mok et al. 2017b), and it is important to consider the implications of such complexities for stakeholder management (Mok et al. 2015; Ershadi et al. 2021). It has been argued that patterns of relationships among stakeholders appear based on the centrality of organizations (Aaltonen & Kujala 2016). Centrality is defined as the number of direct relationships a stakeholder has in the network, based on which it holds an influential position in the network (Rowley 1997). The existence and influential position of central stakeholders in the project network can lead to either shared project goals or diverging project goals, which depends on the network dynamics, complexities, and adopted project delivery method (Pryke 2004; Clegg et al. 2016; Loosemore et al. 2020).

### 2.3.2 Social network analysis

Social networks and their analysis have roots in sociology, anthropology, psychology and graph theory, but over a period of time, they have emerged into an interdisciplinary field (Castells 2000; Scott 2017). It is an approach of thinking about our social systems where the focus is on the ties (relationships) among numerous nodes (stakeholders) and their characteristics (Borgatti et al. 2018). There are different types and structures of networks, and they have different levels,
such as networks at the organizational level, networks between individuals within an organization, and networks between professionals in different organizations (Kadushin 2012).

From a structural perspective, a network has different properties at the stakeholder (node) level and at the network or project level, such as degree and in-degree centrality are stakeholder-level properties, whereas density, centralization and complexity are network-level properties (Kim et al. 2011; Adami & Verschoore 2018). Degree centrality is the simplest measure of centrality for networks – that are undirected – in which the number of ties a stakeholder has are measured. For example, if the tie is a contractual relationship, then degree centrality is the number of contracts a stakeholder has in the respective network, whereas in-degree centrality is applicable to directed networks to count the number of incoming ties (Borgatti et al. 2018).

Density is a network-level property that expresses the number of relationships as a percentage of the maximum number of relationships possible in the network (Borgatti et al. 2018). This indicates the overall interconnectedness of any network such as, a density of 1 represents that all stakeholders are connected with each other (Scott 2017). Centralization is also a network-level property that is an extension of degree centrality and deals with the extent to which the authority or influence in a network is concentrated or dispersed (Choi & Hong 2002) or the extent to which a network is dominated by FOs in terms of the control of materials flow and relationship management (Kim et al. 2011). Complexity is another network-level property that deals with the number and variety of subsystems and their varied goals present in a system (Choi & Hong 2002; Adami & Verschoore 2018). Core-periphery measures uncover the degree of complexity in terms of stakeholders’ classes and their level of dependency (Chowdhury et al. 2011; Kim et al. 2011; Borgatti et al. 2018).

### 2.3.3 Project networks

Three types of networks and associated relationships (contractual, supply and information) have been identified in the networks and projects literature (Adami & Verschoore 2018). A contractual network refers to a group of stakeholders linked through a contractual relationship (Kim et al. 2011). The contractual network can be viewed in terms of governance, as contracts between different stakeholders are formal instruments of governance expressing the control of a stakeholder over other stakeholders in a project network (Pilbeam et al. 2012). In the literature, contractual
The supply network of goods and services is different from the contractual network because all relationships of supply are not stated in the formal contracts between stakeholders; rather, the related group of suppliers are managed through the separate purchase orders (Choi & Krause 2006). A supply network is a group of suppliers that exist upstream to any one organization in the project network (Porter 1985). It has been argued that the supply network relates to the management and control of services and goods’ transactions between suppliers and buyers in a project network (Borgatti et al. 2013). These transactions could also be considered as relational incidents in which interactions are based on flows of tangible and intangibles items among stakeholders (Borgatti et al. 2018).

The information network is related to the flow of information among project stakeholders for routine project operations and activities (Pryke et al. 2017). Different needs of the stakeholders trigger creation of networks in projects, such as gathering information from some stakeholders, processing it, and distributing it to other stakeholders (Pryke 2012). In other words, the construction project can be seen as a relationship network of its stakeholders, and based on those relationships, they exchange information (Milošević 1989).

2.4 Relational project delivery arrangements

Relational project delivery arrangements (RPDAs), also known as collaborative projects, are based on interorganizational collaboration and related contractual practices (Dietrich et al., 2010; Lahdenperä, 2012).
2.4.1 Types of RPDAs

Relational project delivery arrangements such as integrated project delivery, project partnering and project alliancing, have been around for some time in the construction industry (Lahdenperä 2012; Halttula et al. 2015). Although these arrangements tend to evolve over time, and some practices have become common, but still there are differences. Project alliancing focuses more on joint liability and relational aspects (no-litigation) among project internal stakeholders, as compared to integrated project delivery and project partnering. The key features of a project alliance includes risk and opportunity sharing, no dispute mindset, joint management structure, unanimous decision making for the project’s best, no blame culture, and open book documentation and reporting for transparency (Lahdenperä 2012).

Amid these arrangements, project alliancing heavily rely on agreed pain/gain sharing incentives, early involvement of the key project stakeholders (Walker & Lloyd-Walker 2015; Haaskjold et al. 2020) and open information exchange in relation to pursuing the project goals (Lahdenperä 2017). Project alliancing could be a response to challenges related to the low productivity of construction industry that stems from the fragmentation of a project arrangement under traditional methods in which project internal stakeholders have multiple individual interests rather than common interests (Halttula et al. 2015). This delivery method evolved from the need to improve the delivery of demanding construction projects and provide a better way of dealing with uncertainty, complexity, and generate value for money (Walker & Hampson 2003; Lahdenperä 2019).

2.4.2 Phases of project alliancing

An alliance based project can be divided into three phases: front-end, development and implementation (Walker & Lloyd-Walker 2016; Pargar et al. 2019). Hospital construction project alliances, like other project alliances, start with the front-end phase (Larsen et al. 2021a) in which the project client and the key stakeholders collaborate to shape and define the project (concept), define the shared project goals and make decisions to ensure the strategic success of the project (Williams et al. 2019). The meaning of the term strategic success in the front-end phase is related to defining the long-term purpose of the project, its feasibility, and related success criteria (Williams & Samset 2010). Decision-making in this phase is especially important for the successful delivery of the project (Walker & Lloyd-Walker 2016).
since this phase is characterized by a high level of complexity and uncertainty of the environment and a low level of available information in terms of stakeholder identity and requirements (Williams et al. 2019). The main tasks of this phase are related to project definition and the selection of the project team or internal stakeholders (Pargar et al. 2019). Moreover, aligning stakeholder interests with shared project goals, and accordingly developing trust (Manata et al. 2021), occurs in this phase.

The development phase starts immediately after the selection of the project team and the execution of the development-phase agreement (Lahdenperä 2017). This phase starts with the aim of jointly developing formal rules, plans, processes and procedures for the project that are related to design, innovation management, the commercial model, collaborative behavior and risk management (Walker & Hampson 2003; Hietajärvi et al. 2017). The outcome of the development phase is complete implementation plans that are executed in the implementation phase, and the main tasks of this phase include the execution of project works, change management, quality management, the management of risks and uncertainties, and value creation (Pargar et al. 2019). This phase is guided by the joint organization structure and risks sharing in a no-blame culture where decisions are made unanimously, which helps project internal stakeholders maintain their individual objectives in alignment with the shared project goals (Lloyd-Walker et al. 2014). However, stakeholders involved in such arrangements require certain capabilities in relation to interorganizational relationships such as cooperation, control, coordination, and collaboration (Zhu et al. 2020).

2.5 Perspectives of interorganizational relationships

The literature of interorganizational relationships is influenced by different theoretical perspectives and there are multiple related theories such as resource-based view, resource dependence, social relationships, contingency theory, game theory, and transaction cost economics. Resource-based view considers interorganizational alliances for achieving competitive advantage through combining and sharing their resources; resource dependence views alliances from the perspective of a power balance in terms of the control of critical resources; social relationships focuses on building the stakeholders’ relationship within an alliance; contingency theory focuses on organizational structures and how these structures are influenced by uncertainty and the interdependence of stakeholders for common goals; game theory focuses on stakeholders’ incentives and how these
can be influenced by adopting a long-term collaboration; transaction cost economics considers alliances as governance structures for achieving collaboration among stakeholders (Parkhe 1993; Mellewigt et al. 2007; Kretschmer & Vanneste 2017).

2.5.1 Interorganizational cooperation

Cooperation can be viewed as a starting point for organizations to exchange essential information for the purpose of engaging partners in long-term relationships (Spekman et al. 1998). This could also be viewed as the alignment of interests or incentives through which stakeholders show their willingness to work together towards common goals (Gulati et al. 2012; Kretschmer & Vanneste 2017). Interorganizational cooperation is based on two basic elements: (1) the beginning of a beneficial relationship with the aim of mutual goals and (2) the development of mutual trust by preventing opportunism (Parkhe 1993). It refers to the behavior that is required to engage in any reciprocal interaction to enable the collaborative relationships process (Bedwell et al. 2012).

Successful reciprocal interaction is the outcome of cooperation among the project stakeholders (Kaulio 2018). Cooperation is related to the mutual benefits of an alliance rather than the private benefits of any individual stakeholder (Castañer & Oliveira 2020). Relational risk could be one of the biggest risks in an alliance in which stakeholders lack cooperation and seek their self-interest (Eckhard et al. 2012). Alliance contracts impose limits on the behavior of stakeholders through contractual governance (provisions related to a shared understanding of the roles and to legal authority) to promote cooperation and avoid exploitation (Lumineau & Malhotra 2011). Cooperation is one of the important competencies that is required to establish a project alliance (Zhu et al. 2020).

2.5.2 Interorganizational control

From the perspective of transaction cost economics, contracts function as a controlling device (Mellewigt et al. 2007). From this perspective, stakeholders involved in interorganizational relationships use contracts for control in order to bring compliance to a desired outcome and restrict opportunism through contractual provisions (Etzioni 1965; Yao et al. 2021). The control provisions are generally related to restrictions, legal enforcement, decision rights, obligations, liquidated damages, and dispute resolution (Weber et al. 2011; Gulati et al., 2012;
Zhang et al., 2016; You et al., 2018) to bring compliance to a desired outcome through the exercise of power or authority (Mellewigt et al. 2007). Moreover, the capability of project stakeholders in terms of control is important for decision-making in relation to project goals (Zhu et al. 2020).

Project stakeholders create control mechanisms in line with their governance structure (contractual or relational), which can be adjusted to achieve the right balance between rigor and flexibility in accordance with project objectives (Ferrer et al. 2020). Governance is a system through which an organization is controlled and directed in accordance with established plans and rules (Pinto 2014). To comply with these plans and rules, control mechanisms (formal or informal) are created and implemented; these include linking payment to formal performance milestones or linking payment to shared goals and achieving related incentives through collaboration (Kirsch 1997; Jagtap & Kamble 2020).

### 2.5.3 Interorganizational coordination

The stakeholders’ involvement and their structure in interorganizational projects plays an important role in the success of the projects (Dietrich et al. 2010). The term structure refers to how various stakeholders divide and arrange their resources to accomplish their interdependent tasks through coordination (Klessova et al. 2020). Coordination refers to the degree of mutual understanding among project stakeholders in relation to the shared project goals and the structure of related tasks of each stakeholder without gaps and overlaps (Hoegl & Gemuenden 2001). It is related to the integration and sequencing of stakeholders’ resources to accomplish their interdependent tasks (Marks et al. 2001; Okhuysen & Bechky 2009). In other words, it is related to the alignment of stakeholders’ actions for achieving common goals (Castañer & Oliveira 2020). The main challenge is how to organize the resources of project stakeholders to ensure coordination (Mellewigt et al. 2007).

One way to handle this challenge is through contractual governance where the rights, obligations, and roles of stakeholders are clearly defined and the focus of contractual provisions is on the mutual expectations, avoid misunderstandings and maintain coordination (Lumineau & Malhotra 2011). The coordination provisions are related to communication procedures, clear task descriptions and definitions that enable stakeholders to manage task interdependencies and reach consensus to achieve the desired mutual outcomes (Mellewigt et al. 2007; Argyres et al. 2007; Gulati et al. 2012). Another mechanism is related to building alliance management capability in terms of coordination during the alliance-establishment stage (Zhu et
al. 2020). Such capabilities are important to avoid coordination failures that stem from organizational structures, cultural differences, predictive knowledge, and cognitive limitations of stakeholders in terms of scheduling of tasks and their interdependencies (Puranam et al. 2012).

2.5.4 Interorganizational collaboration

Collaboration can be viewed as a dynamic process through which multiple stakeholders eagerly engage in joint interdependent activities to achieve their common goals (Bedwell et al. 2012). In this process, stakeholders pursue to build collaborative relationships to gain mutual benefits (Saukko et al. 2020). Interorganizational collaboration is a complex process that includes multiple steps and integral elements of bringing stakeholders together from different perspectives (Gulati et al. 2012). There has been an increased shift for interorganizational collaboration in project-based organizations to reduce transaction costs (Dietrich et al. 2010; Haaskjold et al. 2020).

Transaction costs are related to the front-end (preparation, concept design, negotiations), development (design development, plans, rules, and processes development), and implementation (execution of plans, governance) phases of construction projects (Li et al. 2015; Walker & Lloyd-Walker 2016). The transaction costs linked with dispute resolution in construction projects could be considerably high and do not add any value to the project (Lu et al. 2015). Stakeholders’ early involvement and integration in the front-end phase and effective collaboration in the development and implementation phases reduce transaction costs (Guo et al. 2016). Interorganizational collaborative projects are characterized by efficient coordination, common interests, and trusting relationships among stakeholders (Romero-Torres 2020).

The delivery of large hospital construction projects demand collaboration among several stakeholders (Invernizzi et al. 2019; Larsen et al. 2021b). The key element of collaboration in hospital construction projects is related to the involvement of multi-disciplinary stakeholders at the project front-end phase working together throughout the project phases (Engebo et al. 2020; Larsen et al. 2021a). This practice provides a support to achieve the mutual project goals through cross-functional collaboration and shared vision (Ko et al. 2011; Fanousse et al. 2021). However, there are numerous factors that influence collaboration in construction projects, such as uncertainty, organizational efficiency, trust, and changes in the scope of the work (Haaskjold et al. 2020).
2.6 Assumptions of behavior in transaction cost economics

Production and exchange occur through price mechanism which involves monetary transaction, and that transaction has a cost related to making a deal between the organizations or stakeholders in the market. This cost of using the price mechanism is called transaction cost (Eriksson-Zetterquist et al. 2020). The theory of transaction cost economics differs from the traditional economics in several respects, one of which is assumptions of behavior that includes, (a) boundedly rational behavior and (b) opportunistic behavior (Williamson 1993; Eriksson-Zetterquist et al. 2020).

2.6.1 Opportunistic behavior

Despite the importance of developing collaborative behavior among stakeholders in collaborative projects, stakeholders often develop opportunistic behaviors that lead to adversarial relationships (Zhang et al. 2018; Van der Krift et al. 2021). Collaborative behavior is required to involve stakeholders in any mutual interaction to facilitate desired collaboration for the realization of mutual goals (Bedwell et al. 2012). Collaborative relationships depend on collaborative behavior, promoting mutual trust, and preventing opportunistic behavior (Parkhe 1993; Gulati et al. 2012). The main cause of failure in such relationships is that stakeholders start giving preference to their individual interests, which can be viewed as opportunistic behaviors (Kretschmer & Vanneste 2017).

The behaviors of project stakeholders are influenced by different factors, such as institutional and cultural differences, the multiplicity of stakeholders, and conflicting interests (Van Marrewijk et al. 2016). Project alliancing is one of the collaborative methods for construction project delivery that has been largely adopted for large-scale infrastructure projects (Galvin & Tywoniak 2019). This method supports collaborative behavior and provides the possibility to limit opportunism through relational governance structures in which stakeholders focus on joint responsibility for achieving mutual project goals and hold collective liability for project benefits and risks (Galvin et al. 2021).

Although project alliancing promotes collaborative behavior, the highest risk of an alliance is relational risk in case the project stakeholders seek their individual interests rather than mutual project interests and behave opportunistically (Lumineau & Malhotra 2011; Eckhard et al. 2012). This change from collaborative behavior to opportunistic behavior could occur in such projects if any stakeholder
believe that by doing so it would be advantageous to oneself irrespective of the
damage it would cause to the project and whole alliance (Galvin et al. 2021).
However, multiple interactions of stakeholders in a collaborative environment
could influence them to overcome opportunistic behavior (Erkal et al. 2022).
Furthermore, stakeholders’ participation in learning through knowledge integration
and relationship development activities could control opportunistic behaviors and
develop collaborative behaviors (Liu et al. 2022).

2.6.2 Mechanisms for limiting opportunism

It has been observed that interorganizational collaboration could improve project
outcomes, but it depends on the aims and behavior of the involved stakeholders
(Zhang et al. 2022). There is a wide consensus that the opportunistic behavior of
stakeholders could harm collaborative relationships and project goals (Chaudhry et
al. 2020; Li et al. 2022). A range of mechanisms have been proposed in existing
literature that develop collaborative behavior and limit opportunism (Williamson
1993; Gil 2009; Davis & Love 2011; Benitez-Ávila et al. 2018; Zhang et al. 2018;
Dal Bó & Fréchette 2019; Wang et al. 2021). Among these mechanisms, the
important ones which are focused in this study include trust, culture, and

Trust is an important mechanism for promoting interorganizational
collaborative relationships and their dynamics (Xu et al. 2021), an approach for
dealing with interdependencies and related uncertainties of stakeholders (Kalkman
& de Waard 2017), a key success indicator for collaborative relationships and
increasing the related commitment among stakeholders (Walker & Hampson 2003;
Rauniar et al. 2019), a tool to enable relational governance and related collaborative
behavior (Benitez-Ávila et al. 2018; Ruijter et al. 2021), and an ideal response to
cope with opportunism (Williamson 1993; Yu 2019). From the perspective of
sociology, trust plays an important role in relationship development and limiting
opportunism (Lau & Rowlinson 2009). Project management view on trust is
multifaceted and depends on delivery method adopted for the project; trust is an
important element in developing collaborative behavior in collaborative projects,
and it can be considered an alternative for control and reduces the transaction costs
(e.g., contracts administration), which are relatively high in traditional project
delivery methods (Cerić et al. 2021).

Organizational culture is a broad concept and could be observed through
multiple perspectives, across multiple disciplines and aspects (Johnson 1988). The
project organizational culture is formed by the stakeholders of that project organization and their behaviors and attitude (Li et al. 2022). This is formed by creating a desired work environment (i.e., a collaborative environment), which can guide stakeholder behavior (Masterson 2001; Abell et al. 2008). Project stakeholder behaviors are influenced by their experiences, and sometimes these experiences confront with the new work environment and related culture, which creates various challenges in their relationships, such as insufficient information flow among project stakeholders and issues in decision-making and control (Gil 2009; Fréchette et al. 2020). Project organizations should select their stakeholders (alliance partners) based on required skills and values that work best for the project and foster no-blame culture rather than selecting the partners based on price (Pitsis et al. 2003).

Organizational governance is also a broad concept and existing literature talks about different types of governance in different organizational settings such as public governance, IT governance, knowledge governance, network governance, and project governance (Too & Weaver 2014). The project governance has different systems and structures that are important to govern various functions such as determine who does what (peoples’ governance), how value of executed works are evaluated and paid (project financial governance), how disputes are resolved (governing relationships), how project alliance is organized and managed, what are the project management procedures and decision-making system (Too & Weaver 2014; Galvin et al. 2021). Countries such as UK and Norway have implemented a specific governance framework for public infrastructure projects, which is established within government institutions as an authoritative organizational structure to improve project performance through predefined rules and processes (Brunet & Aubry 2016).

Since project governance is embedded within the permanent organization’s governance framework, it follows the permanent organization’s policies to accomplish stakeholder goals (Muller 2009). Different governance mechanisms related to different project delivery methods – collaborative and traditional – have been reported in the existing literature to limit opportunism (Xue et al. 2017). In relation to the context and implemented project delivery method, different contractual and relational governance mechanisms need be adopted complementarily to support and maintain collaborative behavior among stakeholders and limit opportunism (Benítez-Ávila et al. 2018).
2.7 Synthesis of the literature review

The above literature review has been synthesized to provide a foundation for analyzing, developing, and managing stakeholder relationships in collaborative hospital construction projects. The synthesis establishes a link between the theories and literature streams employed in this thesis (Figure 5).

To describe how stakeholders interact with each other on the permanent organization level and temporary project organization level, one must consider the environment within which multiple and interdependent stakeholder relationships exist (Aaltonen et al. 2010; Demir et al. 2015; Rajablu et al. 2017), and one approach for analyzing such an environment is through the concept of social network theory (Rowley 1997). The social network perspective represents stakeholder relationships within the project environment from different project networks (contractual, supply, and information) and patterns of interactions (Scott 2017; Adami & Verschoore 2018) and their influence on the coordination and control of project stakeholders.

This shows complexity and uncertainty present within the stakeholder environment, which creates a variety of challenges for projects that demands better coordination and control among project stakeholders (Whyte & Lobo 2010; Yao et al. 2021). To reduce such challenges, a project manager conducts stakeholder analysis – stakeholder identification and mapping – to develop interpretations and a big picture of the stakeholder environment to ensure careful and informed decision-making in the project (Aaltonen 2011).

The project complexity in contractual network is related to the number of relationships that require coordination due to a higher number of formal interactions (Choi & Hong 2002). The supply network of projects are considered complex because of their need for coordination and control concerning the flow of materials rather than operational load (Kim et al. 2011; Adami & Verschoore 2018). The complexity of the information network is related to collection and flow of information among various project stakeholders and its desired coordination and control (Pryke 2012; Pryke et al. 2017).
The literature review shows that, in RPDAs, project stakeholders aim to achieve mutual project goals through integration, cooperation, collaboration, and joint decision-making to a varying degree depending on the adopted delivery arrangement (Lahdenperä 2012; Bohnstedt & Wandahl 2019; Klessova et al. 2020). It has been stated that interorganizational integration is closely related to interorganizational coordination; it addresses how different stakeholders collectively accomplish their interdependent tasks (Okhuysen & Bechky 2009; Hietajärvi et al. 2017).

The literature of interorganizational relationships contains various perspectives and forms of stakeholder relationships, such as interorganizational cooperation, control, coordination, and collaboration (Mellewigt et al. 2007;
Interorganizational cooperation does not ensure cooperation among the stakeholders until they develop an appropriate attitude that is required to focus on the shared goal and align their interests accordingly rather than focusing on the individual goal (Bedwell et al. 2012; Kretschmer & Vanneste 2017). It has been argued to develop cooperation through trust along with a certain element of control (Okamuro 2007; Lumineau & Malhotra 2011).

Interorganizational control is articulated by the project alliance contract and functions as a controlling mechanism (Mellewigt et al. 2007). Although alliance contracts restrain opportunistic attitudes, they lack clarity in terms of stakeholders’ roles and their related tasks, which could compromise the achievement of project goals irrespective of the full cooperation among project stakeholders (Eckhard et al. 2012). The complexity of tasks and their interdependency in construction projects demand an effective coordination of stakeholders’ resources to achieve joint activities and the project’s goals (Gulati et al. 2012; Kujala et al. 2020). Thus, proper attention should be paid to the coordination structure of the project along with the control mechanisms (Yao et al. 2021).

Interorganizational coordination provides a structure through which stakeholders divide and arrange their resources, aiming to engage in a dynamic process to accomplish their interdependent tasks to achieve mutual outcomes (Dietrich et al. 2010; Bedwell et al. 2012; Klessova et al. 2020). Hence, interorganizational collaboration should not be considered a stand-alone static process; instead, it should be viewed as a dynamic process that incorporates and interplays with cooperation, control, and coordination.

In collaborative construction projects, managing collaborative relationships among project stakeholders has been an issue for which stakeholders need to adopt different mechanisms that develop cooperative behavior and limit opportunism (Williamson 1993; Gil 2009; Lloyd-Walker et al. 2014; Galvin et al. 2021).
3  Research contribution

This chapter presents and synthesizes the research results of the original publications. Figure 6 describes the research questions of this thesis and relates them to the related literature and the research results.

Fig. 6. Research questions and their relationships with the literature and results.

3.1  Stakeholders in the healthcare process

Publication I explores the management of stakeholder relationships and identifies challenges that impact them at the healthcare process level. It presents empirical evidence of the structure of the healthcare process network of northern Finland and the position of stakeholders in that network. It also explains the numerous challenges that exist in the healthcare process of northern Finland, especially in the network of healthcare stakeholders. Figure 7 presents the position of stakeholders in three circles of influence – internal stakeholders, interface stakeholders, and external stakeholders – which is based on general practice in healthcare.
Figure 8 presents the structure of the network and stakeholders’ positions based on degree centrality, which shows multiple circles of influence depending on the number of ties a stakeholder has in the network. The node numbers and labels used in this figure are listed in Table 4.
Fig. 8. Network structure based on degree centrality (Reprinted from Publication I © 2022 Inderscience Enterprises Ltd.).

Table 4. Node numbers and labels used in Figure 8 (Reprinted from Publication I © 2022 Inderscience Enterprises Ltd.).

<table>
<thead>
<tr>
<th>Node nrs</th>
<th>Stakeholder</th>
<th>Node label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Northern Ostrobothnia Healthcare District</td>
<td>NOHD</td>
</tr>
<tr>
<td>2</td>
<td>Owners - Steering Group</td>
<td>O-SG</td>
</tr>
<tr>
<td>3</td>
<td>Owners - 29 Municipalities</td>
<td>O-29M</td>
</tr>
<tr>
<td>4</td>
<td>Board of Trustees Council</td>
<td>BOTC</td>
</tr>
<tr>
<td>5</td>
<td>Trustees with Policy Authority</td>
<td>TWPA</td>
</tr>
<tr>
<td>6</td>
<td>Corporate Office / Admin Executives</td>
<td>CO/AE</td>
</tr>
<tr>
<td>7</td>
<td>Collaboration Services</td>
<td>CS</td>
</tr>
</tbody>
</table>
This depicts that the identification and mapping of stakeholders is not sufficient as it does not describe the full picture of stakeholders’ environment. The network’s structure and the position of stakeholders in there based on their interactions’ pattern are also vital to gain a complete understanding of the complexity and dynamics of stakeholders’ environment.

The study also identifies various challenges in the healthcare process network through the first-order codes (used by respondents), second-order concepts, and related aggregate themes (induced by the researcher) that are illustrated in Table 5. The challenges are categorized under six themes: gaps in healthcare network, challenges in articulating a healthcare vision, triggers of challenges, contextual challenges, challenges in trust-building and collaboration, and the healthcare landscape. In addition, this study presents a grounded theoretical model illustrating the interrelationships between these themes and how they impact stakeholder relationships and their management (Figure 9). These findings indicate that analyzing the relationships among multiple stakeholders in a network is a complex process.
Fig. 9. Grounded theoretical model of challenges in stakeholder relationship management in healthcare (Reprinted from Publication I © 2022 Inderscience Enterprises Ltd.).

Table 5. Data structure on analyzed challenges for stakeholder relationships (Reprinted from Publication I © 2022 Inderscience Enterprises Ltd.).

<table>
<thead>
<tr>
<th>1st Order Codes</th>
<th>2nd Order Concepts</th>
<th>Aggregate Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of information flow</td>
<td>Communication gap</td>
<td>Gaps in healthcare network</td>
</tr>
<tr>
<td>No communication plan in place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarity of information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information dynamics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filling system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of resource and patient sharing</td>
<td>Cooperation gap</td>
<td></td>
</tr>
<tr>
<td>Lack of interaction among stakeholders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of active participation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disconnect between healthcare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>organizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficient time management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disconnect between treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Order Codes</td>
<td>2nd Order Concepts</td>
<td>Aggregate Themes</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>--------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Focus on individual goals</td>
<td>Misalignment of goals</td>
<td>Challenges in articulating a healthcare vision</td>
</tr>
<tr>
<td>Lack of common understanding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conflicting goals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment complexity</td>
<td>Planning issues</td>
<td></td>
</tr>
<tr>
<td>Large scale revisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of stakeholders' analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninformed decisions</td>
<td>Lack of innovation</td>
<td></td>
</tr>
<tr>
<td>Processes and treatments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Future healthcare facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of coordination in decision making</td>
<td>Decision making</td>
<td>Triggers of challenges</td>
</tr>
<tr>
<td>Lack of decision-making system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ownership of the decisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reactive behavior</td>
<td>Conflicts</td>
<td></td>
</tr>
<tr>
<td>Long queues in special healthcare</td>
<td>Internal migration</td>
<td>Contextual challenges</td>
</tr>
<tr>
<td>Lack of resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal migration</td>
<td>Funding</td>
<td></td>
</tr>
<tr>
<td>Lack of incentives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-operational facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central hospitals</td>
<td>Medical resource</td>
<td></td>
</tr>
<tr>
<td>Emergency services</td>
<td>shortage</td>
<td></td>
</tr>
<tr>
<td>Primary healthcare centres</td>
<td>Area of responsibility</td>
<td></td>
</tr>
<tr>
<td>University hospital</td>
<td>Area of responsibility</td>
<td></td>
</tr>
<tr>
<td>Area of responsibility</td>
<td>Area of responsibility</td>
<td></td>
</tr>
<tr>
<td>Different organizations' cultures</td>
<td>Mistrust</td>
<td>Challenges in trust-building and collaboration</td>
</tr>
<tr>
<td>Communication gap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Different perceptions of organizations</td>
<td></td>
<td></td>
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<tr>
<td>Funding allocations</td>
<td></td>
<td></td>
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<tr>
<td>Budget deficit and control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affect well-being of citizens</td>
<td></td>
<td></td>
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<tr>
<td>Influence on healthcare process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affect relationships negatively</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current governance structure</td>
<td>Governance structure</td>
<td></td>
</tr>
<tr>
<td>Lack of stakeholder governance</td>
<td></td>
<td></td>
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<tr>
<td>Role distinction between organizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establishing collaborative culture</td>
<td>Stakeholder collaboration</td>
<td></td>
</tr>
<tr>
<td>Maintaining collaboration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adopting the right communication approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variety of stakeholders and their requirements</td>
<td>Healthcare network</td>
<td>Healthcare landscape</td>
</tr>
<tr>
<td>Different institutional backgrounds</td>
<td>complexity</td>
<td></td>
</tr>
<tr>
<td>High density &amp; centrality network</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared responsibility</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.2 Stakeholder networks in hospital projects

Publication II investigates stakeholder relationships from the perspective of network theory. It adopts the SNA approach to explore the structural characteristics of stakeholder networks. The study proposes three different types of stakeholder networks that exist in a construction project, which are based on the synthesis of the project network literature and stakeholder social network perspective. This theoretical framework is empirically tested in a hospital construction project to obtain an in-depth understanding of the research phenomenon.

The study presents empirical evidence of the structure of the collaborative hospital construction project network and the position of project stakeholders in the network. It also presents the implications of network relationships for the coordination and control of project stakeholders. Figure 10 presents the structure of the project network and its types. The size of the nodes presents the degree centrality of each stakeholder in the relevant type of network. The project stakeholders involved in both Alliances A and B are illustrated in Appendices 1 and 2.

The findings show that there are three types – contractual, supply, and information – of network relationships among stakeholders that exist in a construction project. These relationships have varying degrees of influence, control, and coordination depending on the delivery method adopted in a project. The structure of the contractual network among project stakeholders is based on formal relationships, and related stakeholders have influence and control limited to their contractual roles and obligations. The supply network is controlled by a central stakeholder in terms of the coordination of activities and operational load, which can change depending on the project’s contractual and organizational arrangements. The information network is concentrated on the central stakeholders in terms of
information exchange concerning coordination issues, which depend on the project context.
Fig. 10. Networks of alliance projects (Reprinted from Publication II © 2023 Inderscience Enterprises Ltd.).
Table 6 highlights the implications of different types of networks for the coordination and control of stakeholders in collaborative projects. The findings also show that a stakeholder carrying a central position in one network may not appear central in another network. The position and role of a stakeholder change depending on the type of network.

**Table 6. Implications of stakeholder network relationships (Reprinted from Publication II © 2023 Inderscience Enterprises Ltd.).**

<table>
<thead>
<tr>
<th>Network Types</th>
<th>Implications for coordination and control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractual</td>
<td>The contractual networks represent only formal relationships in accordance with the adopted project delivery method; nevertheless, they do not fully express the complexity and interfaces of the project in terms of coordination and control. In collaborative projects, a high-density network does not impact the ability of stakeholders to control or constrain the focal organization’s decisions, as the focus of stakeholders in such projects is on shared and aligned goals. The central stakeholders in contractual networks have influence and control limited to their contractual roles and responsibilities, which vary in different forms of contract.</td>
</tr>
<tr>
<td>Supply</td>
<td>The supply networks of projects are considered complex because of their need for coordination, control, and operational load; these roles are assigned to the respective stakeholders that can vary depending on the adopted delivery method and related organizational arrangements.</td>
</tr>
<tr>
<td>Information</td>
<td>The information networks of collaborative projects are not formal relationship bonds. They also impose no restrictions, and no one has dominance over others in terms of information exchange, rather they facilitate network coordination in terms of information interdependencies.</td>
</tr>
</tbody>
</table>

3.3 Developing stakeholder relationships in hospital projects

Publication III proposes a conceptual framework for developing stakeholder relationships in collaborative hospital construction projects. It addresses the confusion related to the meanings of interorganizational cooperation, control, coordination, and collaboration. The framework (Figure 11) also describes the links among these concepts that proposes different development levels of stakeholder relationships. The study presents the empirical evidence of the challenges at different levels for developing stakeholder relationships in collaborative hospital construction projects. It also proposes preconditions for developing stakeholder relationships in collaborative hospital construction projects.
The study identifies various challenges in relation to developing stakeholder relationships that are categorized under the development levels (cooperation, control, coordination, and collaboration) depicted in the conceptual framework. Table 7 illustrates cooperation related challenges which are categorized under different headings. However, most of them arise from the unaligned stakeholders’ interests, opportunistic behavior, parent organization’s culture, and lack of trust. Table 8 illustrates control related challenges which originate from contractual ambiguities, decision-making, and project restrictions.

**Table 7. Cooperation-related challenges (Reprinted under CC BY 4.0 license from Publication III © 2023 Authors).**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Challenges: Cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alignment</td>
<td>Stakeholders’ interests and incentives are not properly aligned. There is a lack of shared understanding of the alliance contract and its governance.</td>
</tr>
<tr>
<td>Behavior</td>
<td>Misunderstandings among stakeholders raise issues that could lead to a situation where it is hard to adopt a best-for-project attitude. Pending issues lead to negative behavior among stakeholders.</td>
</tr>
<tr>
<td>Culture</td>
<td>It is challenging to change the working habits of stakeholders that they have inherited from their parent organizations. It is a hard and time-consuming process to come out of their parent organization culture, unlearn old habits, and learn new ways of working. There is no mechanism to evaluate the capabilities of a client to run an alliance project, which sometimes leads to challenges.</td>
</tr>
</tbody>
</table>
Categories: Cooperation

Competitors
Some stakeholders are part of project alliances, but they are competitors in the construction industry, which causes challenges.

Opportunism
Some stakeholders seek their individual benefits rather than leveraging the skills of alliance partners to gain strategic advantage for the whole project alliance.

Trust
Lack of trust among stakeholders leads to a lack of project alliance success. This causes disputes, which do not fit into the project alliancing philosophy.

---

**Table 8. Control-related challenges** (Reprinted under CC BY 4.0 license from Publication III © 2023 Authors).

<table>
<thead>
<tr>
<th>Categories</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambiguities</td>
<td>Contractual provisions conflict with the governance system of an alliance. This causes opportunism and lack of trust among stakeholders.</td>
</tr>
<tr>
<td>Decision-making</td>
<td>Decision-making is a difficult and time-consuming process due to the involvement of a huge number of stakeholders, unclear scope definitions and tasks descriptions, and subsequent conflicts. In addition, conflicts between the temporary and permanent organizations in terms of decision rights slow down the decision-making process, which causes schedule overrun.</td>
</tr>
<tr>
<td>Restrictions</td>
<td>Inappropriate budget restrictions cause problems and negative implications for the governance mechanisms adopted on a project.</td>
</tr>
</tbody>
</table>

---

Table 9 illustrates coordination related challenges that are caused by lack of information clarity, inefficient information exchange, lack of integration and mutual understanding, constant changes in design and plans, unclear roles and responsibilities, and lack of physical proximity among stakeholders.

**Table 9. Coordination-related challenges** (Reprinted under CC BY 4.0 license from Publication III © 2023 Authors).

<table>
<thead>
<tr>
<th>Categories</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Effective communication is challenging due to the complexity of this project in terms of the number and variety of stakeholders involved. In addition, clarity of information is lacking in stakeholders’ communication due to their different backgrounds and understandings.</td>
</tr>
<tr>
<td>Conflicts</td>
<td>Most conflicts arise from the delay in information exchange between stakeholders. Some conflicts are born of ambiguous contractual provisions.</td>
</tr>
<tr>
<td>Integration</td>
<td>Stakeholders are not able to integrate themselves into an alliance due to a lack of belief in mutual success and their individualistic mindset. Furthermore, the prolonged availability of resources for interdependent tasks is challenging.</td>
</tr>
<tr>
<td>Mutual understanding</td>
<td>There is a lack of mutual understanding about the form of contract being adopted for this project, and the majority of subcontractors and suppliers are not included in the main alliance agreement.</td>
</tr>
</tbody>
</table>
Categories Challenges: Coordination

Plans and procedures Constant changes in designs and plans cause coordination issues in terms of the scheduling of resources and the alignment of actions. There are changes all the time, and these mainly stem from the permanent organization level (end users), the project level, and the long duration of the project. This has negative implications for the goals and objectives set at the start of the project.

Roles There are misunderstandings and gaps in the roles and responsibilities of the stakeholders as the roles and responsibilities related to the interaction of subprojects are not clearly defined.

Location Stakeholders are not physically co-located, which has negative implications for their interaction as the lack of physical proximity leads to different coordination issues.

Table 10. Collaboration-related challenges (Reprinted under CC BY 4.0 license from Publication III © 2023 Authors).

<table>
<thead>
<tr>
<th>Categories</th>
<th>Challenges: Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active engagement</td>
<td>Only a limited number of stakeholders could achieve a higher degree of mutual understanding and engagement. This has negative implications on mutual project goals.</td>
</tr>
<tr>
<td>Shared vision</td>
<td>The stakeholders’ lack of a shared vision in relation to project goals has negative implications.</td>
</tr>
</tbody>
</table>

Table 10 illustrates collaboration related challenges that are caused by lack of active engagement and shared vision due to lack of focus on cooperation, control, and coordination related issues. As collaboration is a multilevel process that includes multiple activities related to cooperation, control, and coordination which needs to be actioned in an organized manner.

The study also proposes preconditions (Table 11) related to the development levels (cooperation, control, coordination, and collaboration) that could be followed to mitigate the associated challenges.

Table 11. Preconditions for developing relationships at different levels (Reprinted under CC BY 4.0 license from Publication III © 2023 Authors).

<table>
<thead>
<tr>
<th>Levels</th>
<th>Preconditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperation</td>
<td>Information exchange is a continues process that must be conducted at different levels. The capabilities of all the participating stakeholders, including the client, are evaluated. Induction training and briefings for the participating stakeholders are conducted. Competitors are identified and alignment of their incentives is ensured. An attitude towards common interests is developed. Stakeholders have a mutual awareness of the project requirements. Volunteer services to enhance trust are offered.</td>
</tr>
</tbody>
</table>
Levels | Preconditions
---|---
Control | Unambiguous alliance contracts are used to avoid individual interpretations and related opportunism. Only relevant stakeholders should be invited to participate in the decision-making discussions. Decision-making rights and associated power must be used for the common goals. Understanding and consensus among stakeholders on project goals is a must.
Coordination | Different communication tools should be adopted to ensure the delivery of required information. Capability to align actions with other stakeholders to accomplish interdependent tasks is developed. Stakeholders must believe in developing trust for mutual success and understanding of goals. Well-informed plans and procedures for effective coordination are developed. Conflicts are accepted and amicable solutions for the same are targeted. Clarity in stakeholders’ roles and responsibilities is a must. Gap-free task descriptions and definitions are developed.
Collaboration | Development of cooperation, control, and coordination aspects are focused on.

### 3.4 Managing stakeholder relationships in hospital projects

Publication IV addresses the issue of opportunism in construction projects by proposing different mechanisms and related actions that restrict opportunism and develop collaborative behavior among project stakeholders. The study presents empirical evidence of various mechanisms – conditions of satisfaction (COS), trust, culture, and governance – that develop collaboration and limit opportunism among project stakeholders. The study investigates this phenomenon in hospital construction projects from a practical perspective to obtain further insights for the purpose of improvements in managing opportunism in stakeholder relationships in different phases of a project alliance.

The findings of the study are categorized under themes and preliminary categories that emerged from the coding process (theory-driven and data-driven), as depicted in Figure 12. The findings show that all identified mechanisms are important in limiting opportunism and driving collaborative behavior among stakeholders. Each mechanism is necessary, and they should not be considered in isolation as they not only influence but also complement each other. The study also relates these mechanisms to different phases (front-end, development, and
implementation) of a collaborative hospital construction project, as illustrated in Figure 13.

The study also introduces a new theme (COS), related mechanisms, and related actions that have not been explored in the study context. COS refers to an agreement on project priorities among project stakeholders, which is an important element for the alignment of their interests and actions. These stakeholders are engaged through a nontraditional selection process where each stakeholder inputs a value proposition based on their knowledge and expertise. COS are codeveloped among stakeholders as additional criteria that are used to address project objectives, define design parameters, make decisions (defining decision-making structure), define critical success and roles and responsibilities of project stakeholders, develop plans (cost, time, quality, risk, and opportunity), identify tools and methods for collaboration and expected behaviors, and drive project culture in order to make the project stakeholders satisfied with the outcomes of the project.

The findings suggest that the actions related to the proposed mechanisms should be performed carefully, keeping in mind the context and different phases of the hospital project.
Fig. 12. Data structure.
3.5 Synthesis of results

The objective of this thesis is to enhance the understanding of how stakeholder relationships can be analyzed, developed, and managed in collaborative hospital construction projects. This is addressed through the following research problem: What are the prerequisites and mechanisms for developing and managing
collaborative relationships among stakeholders in hospital construction projects? The research problem is addressed by answering the research questions. To manage stakeholder relationships in collaborative hospital construction projects, first, the permanent organization of healthcare delivering such a project as a project client is studied along with its entire network at the healthcare process level. Thus, the structure of the healthcare process network and the position of stakeholders in that network are identified. Moreover, the challenges in the healthcare process are identified and explained. After that, the participating organizations in the hospital construction project are studied by introducing the structural characteristics of different types of project networks and their implications for the coordination and control of project stakeholders. Then, the levels for developing stakeholder relationships in collaborative hospital construction projects are proposed, along with the identification and examination of related challenges and preconditions. Finally, the study proposes a list of mechanisms and related actions to manage and maintain collaborative relationships among stakeholders in hospital construction projects. The research results presented in Sections 3.1–3.4 are synthesized in Figure 14 and summarized in Table 12.

**Table 12. Summary of results.**

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Challenges in the structure of the healthcare process</td>
<td>Presents the structure of the healthcare process network.</td>
</tr>
<tr>
<td></td>
<td>Presents the position of healthcare stakeholders in the network.</td>
</tr>
<tr>
<td></td>
<td>Explains the challenges that exist in the healthcare process.</td>
</tr>
<tr>
<td>2. Structural characteristics of different types of project networks and their implications for the coordination and control of project stakeholders</td>
<td>Suggests three different types of stakeholder networks that exist in a construction project.</td>
</tr>
<tr>
<td></td>
<td>Provides empirical evidence of hospital construction project networks and the position of stakeholders in these networks.</td>
</tr>
<tr>
<td></td>
<td>Presents the implications of network relationships for the coordination and control of project stakeholders.</td>
</tr>
<tr>
<td>3. Levels and preconditions for developing stakeholder relationships in collaborative hospital construction projects</td>
<td>Suggests a conceptual framework for developing stakeholder relationships in collaborative hospital construction projects.</td>
</tr>
<tr>
<td></td>
<td>Presents preconditions for developing stakeholder relationships in collaborative construction projects.</td>
</tr>
</tbody>
</table>
Research questions | Main results
--- | ---
4. Mechanisms and related actions for managing collaborative relationships in hospital construction projects | Identifies different mechanisms that restrict opportunism and develop collaboration among project stakeholders. Suggests related actions for managing opportunism in stakeholder relationships in different phases of a hospital construction project.

First, it is suggested to analyze the network of permanent organizations of the healthcare process by identifying and mapping the stakeholders and identifying challenges in the network of healthcare stakeholders. These organizations define the project concept (master plan) and shared project goals. This would help the project alliance to understand the context of the hospital construction project, related challenges, complexities, dynamics, and requirements that the project should meet. This would also help the project alliance to develop a fully informed master plan that meets the needs of the entire network of healthcare stakeholders. When a project alliance understands the business side of the healthcare process, then they are in a better position to plan, design, and construct a state-of-the-art healthcare facility – hospital – that meets the care needs. This would develop cooperation among project stakeholders, which is a prerequisite for developing collaborative relationships and can be viewed as a starting point for project stakeholders to align their interests to the shared project goals.
Fig. 14. Synthesis of results.
Second, it is equally important to analyze the network of stakeholders and the types that exist on a hospital project level. A complete understanding of the structure of the hospital construction project networks and the position of project stakeholders in these networks would guide the project alliance regarding the varying degree of control and coordination requirements of project stakeholders. The structural characteristics, associated complexities, and dynamics of different types (i.e., contractual, supply, and information) of network relationships are a fundamental factor in stakeholder relationship development in an alliance project. Although a hospital construction project procured through project alliancing supports collaborative behavior among project stakeholders, such complexities and dynamics of different stakeholder networks within a project could influence stakeholder relationships, for which a project alliance should be vigilant and able to deal with differing levels of opportunism among stakeholders.

Third, the project stakeholders representing the project alliance need clarity related to the meanings of interorganizational cooperation, control, coordination, and collaboration in terms of development levels of stakeholder relationships. As these concepts are at the core of stakeholder relationships in collaborative projects, and collaboration should not be viewed as a stand-alone static process, it is a multilevel process that includes multiple activities. The project stakeholders should have a clear understanding of the interplay between cooperation, control, coordination, and collaboration and how stakeholder relationships develop at different levels. Moreover, this study has identified related challenges that a project alliance could face on each level and has proposed related preconditions that could be followed to mitigate such challenges. This shared understanding would place the project alliance in a better position to align their interests and actions and develop a shared vision that is completely aligned with the project goals.

Finally, this thesis has identified different mechanisms and related actions that could enable the project alliance to restrict opportunism and develop collaborative behavior among project stakeholders. These mechanisms could provide a better way for the project alliance to manage the opportunism in stakeholder relationships in different phases of a collaborative hospital construction project.
4 Discussion

4.1 Theoretical implications

This thesis mainly contributes to the literature on stakeholder networks, RPDAs, and collaboration in construction projects, which is done through the scientific contributions of original publications and general theoretical contributions. Publication I supports the network perspective of stakeholder relationship management, which describes and focuses on the number and variety of relationships present in the environment and their influence (Rowley 1997; Yang et al. 2011; Aaltonen & Kujala 2016). It mainly contributes to the understanding of SNA in stakeholder management (Rowley 1997; Zedan & Miller 2017; Krupa et al. 2018) and relates it to the network of stakeholders in the healthcare process and explanation of various challenges that exist in the healthcare process network. The findings of this study support the need to view stakeholder relationships in any given environment from multiple perspectives to construct it from multiple perspectives (Saunders et al. 2012; Bryman 2012) to properly understand its dynamics for decision-making (Aaltonen & Kujala 2016; Boukhris 2020).

Publication II of this thesis dives deeper into SNA of different types of stakeholder networks (Choi & Hong 2002; Pilbeam et al. 2012; Kim et al. 2011; Mok et al. 2017a) at the hospital project level. This study contributes primarily by analyzing the different types of project networks and their implications for the coordination and control of project stakeholders (Pryke 2012; You et al. 2018; Adami & Verschoore 2018), especially in collaborative hospital construction projects. This study relates different theoretical perspectives and uses multiple approaches to understand the research problem and accordingly proposes solutions that work (Creswell 2009) in the related context.

Publication III proposes a conceptual framework that addresses the confusion related to the meanings of interorganizational cooperation, control, coordination, and collaboration (Spekman et al. 1998; Mellewigt et al. 2007; Dietrich et al. 2010; Romero-Torres 2020; Klessova et al. 2020; Zhu et al. 2020; Castañer & Oliveira 2020) in terms of relationship development levels in the context of collaborative projects. This study also identifies challenges and proposes preconditions related to the levels of stakeholder relationships development. The main theoretical contribution of this study is related to conceptual clarifications about the development levels of relationships in collaborative projects. This study
synthesizes multiple theoretical perspectives of interorganizational relationships and constructs a theoretical framework to enhance understanding of the research problem (Saunders et al. 2012; Bryman 2012).

Publication IV confirms the need to consider multiple mechanisms and related actions to limit opportunism and develop collaborative behavior among project stakeholders in collaborative projects (Sanderson et al. 2018; Galvin et al. 2021). The study proposes mechanisms under four themes: COS, trust, culture, and governance (Gil 2009; Seed 2017; Lau & Rowlinson 2009; Xue et al. 2017; Williams et al. 2019; Rauniar et al. 2019; Ruijter et al. 2021; Li et al. 2022) along with a detailed explanation in terms of their applicability in different phases of the project. The main contribution of this study is related to the recommendation of different actions for managers to develop collaborative behavior and limit opportunism among project stakeholders in different phases of the project. The findings of this study suggest that different mechanisms need to be adopted in different project contexts; accordingly, managers should adjust their actions rather than adopting fixed regulations and standardized procedures (Bryman 2012) to get the desired outcomes.

Apart from the original studies’ theoretical contributions, the overall theoretical contribution of this thesis lies in its theoretical framework and synthesis. The synthesis presents a novel theoretical perspective by establishing a link between different theories and literature streams. According to this, it is important to first understand the larger environment within which the network of stakeholders exists on both the permanent organization level and the project level. Second, understanding the desired form of stakeholder relationships and their development is vital. Finally, managing and maintaining the desired level of stakeholder relationships is important during the project lifecycle. Thus, this thesis presents a deeper understanding of how stakeholder networks should be analyzed on both permanent and temporary project organization levels, how collaboration should be developed among project stakeholders, and the mechanisms and related actions for managing collaborative relationships in collaborative hospital construction projects.

4.2 Practical implications

Although RPDAs have been around for some time to deliver large and complex construction projects through collaborative arrangements, practitioners have still been struggling to find a clear process and steps to develop and maintain collaboration among project stakeholders throughout the project lifecycle. First, it
is important for managers to analyze the stakeholder network at the permanent organization level by identifying and mapping the stakeholders into different classes or circles of influence. This would help managers understand the types of stakeholders and their relationships that exist in the network, which would help identify from where the demands of stakeholders originate and their influence. Such understanding in the context of hospital construction projects would help managers to understand the challenges and requirements that the project should meet. Accordingly, they could develop a fully informed master plan of the project that meets the requirements of the stakeholder network at the healthcare process level. In addition, managers need to analyze stakeholder networks and their types at the hospital project level. Our research findings show that projects are confronted with three different types of networks – contractual, supply, and information – and associated stakeholder relationships. Managers should note that each network type will have its own structure and set of project stakeholders. The position and role of a project stakeholder change depending on the type of network. Such analysis would help managers to have a complete understanding of the structure of the project networks and the position of stakeholders in these networks. This understanding would guide managers to better coordinate and control project stakeholders.

Second, it is also important for managers to have a clear conceptual understanding of the different forms of stakeholder relationships, that is, cooperation, control, coordination, and collaboration. These concepts are at the core of stakeholder relationships in collaborative projects. The findings of this research suggest that collaboration is a multilevel process and that each level requires managers to perform certain activities and meet related preconditions to ensure the desired development of stakeholder relationships at each level. For instance, on the cooperation level, managers should evaluate the capabilities of project internal stakeholders in terms of participating in a project alliance. Accordingly, induction briefings and trainings should be conducted to ensure the alignment of their interests with shared project goals. On the control level, managers must avoid contractual ambiguities while preparing and formalizing the alliance contract. Unambiguous contracts leave no room for interpretations and related opportunism as the rights and obligations stated there lead to shared project goals. On the coordination level, the manager should ensure that the actions of the internal stakeholders of the project are properly aligned to successfully perform interdependent tasks. Accordingly, well-informed plans and procedures are developed to carry out joint activities through effective information exchange and
integration of resources among stakeholders. It is important for managers to adopt multiple information exchange tools to ensure the delivery of desired information promptly to all project stakeholders. It is also vital to ensure that the roles and responsibilities of the project stakeholders are clearly defined and communicated to everyone. Managers should also conduct lessons-learned workshops in which project stakeholders could participate to develop new processes and procedures based on their experiences that could be adopted to resolve future coordination challenges. On the collaboration level, managers must concentrate on individual levels – cooperation, control, and coordination – and ensure that there are no issues on these levels to confirm collaboration among project stakeholders.

Finally, our research proposes different mechanisms and related actions that managers must adopt and implement to restrict opportunism and develop collaborative behavior among project stakeholders. These mechanisms – COS, trust, culture, and governance – could help managers counter the issue of opportunism in large and complex construction projects. Careful application of these mechanisms in different phases of the project could promote collaborative behavior among project stakeholders and limit opportunism. The findings of this research also suggest related actions for managers to undertake in different phases of the project to limit opportunism and promote collaboration. For instance, there are multiple actions to be initiated in the front-end phase of the project that include defining the COS in terms of prioritizing the project objectives and related additional criteria, defining the project processes and tools clearly to develop trust among project stakeholders, defining the desired culture and attitudes for the project alliance, and defining the organizational structure in terms of roles, responsibilities, and overall project governance. These actions will help managers ensure better results in the development and implementation phases of the project. In the development and implementation phases of the project, managers should also ensure that these mechanisms are complemented with additional actions (Figure 13) to further develop and maintain collaborative behavior among project stakeholders.

4.3 Critical evaluation of the research

This thesis is largely based on the qualitative approach and partly on the mixed-methods approach; accordingly, the evaluation criteria are used to assess the reliability and validity of this research, which include internal reliability, external reliability, internal validity, external validity, and construct validity (Creswell 2009; Bryman 2012). Finally, the limitations of the research are also discussed.
Reliability refers to the consistency of the researcher’s approach in terms of clarity and stability of research procedures to repeat research findings in different contexts, or, in other words, the degree to which similar findings are obtained if the study is repeated in a similar context and with similar respondents. In quantitative research, reliability is mainly concerned with the consistency of measures (Bryman 2012), whereas, in qualitative research, it is mainly concerned with dependability (Denzin & Lincoln 2018), which relates to an auditing approach by documenting and keeping the complete records of the entire research process to ensure internal and external reliability.

Internal reliability refers to achieving the inter-observer or inter-researcher consistency (Bryman 2012) in case there are multiple researchers involved in the research. To ensure internal reliability in this research, the interview transcripts, data analysis and findings were peer-reviewed by the other researchers to minimize bias and ensure consistency. It was also ensured during the data analysis that the coding process was documented in the memos, and accordingly, the codes were cross-checked by different researchers.

External reliability deals with replication of the study in different context, which is difficult in qualitative research, as social settings are impossible to freeze (Bryman 2012) but the test of external reliability could be achieved in qualitative research through detailed and step-by-step documentation of the research process and procedures to conduct the same study again by another researcher with an emphasis on the same case rather than replicating the results of one case with a different case study (Yin 2009). To achieve this in this research, detailed data collection and interview guidelines were developed that included information related to the objectives of the research, a survey questionnaire, a detailed process of the use of the survey data, key topics of the interviews, and a list of interview questions. Furthermore, the interview data were recorded, transcribed, and stored in the database created for all original publications. In addition to this, survey data, documentation, and data analysis were also stored in the database for future reference. Moreover, the data analysis process is clearly described in the original publications.

Validity addresses the integrity of the research findings; for instance, in quantitative research, it refers to the issue of whether the measurement items or indicators correctly measure the related concepts. In qualitative research, it refers to rigor in terms of the credibility and transferability of the research, where credibility relates to internal validity and transferability relates to external validity (Bryman 2012).
Internal validity is concerned with establishing a good match between observations and theoretical ideas developed based on these observations (Bryman 2012). On the other hand, it has been argued that internal validity is concerned with explanatory case studies in which a researcher explains why event A led to event B without knowing that there could be another factor C that could influence B (Yin 2009). Another perspective of internal validity in qualitative research talks about the researcher’s ability to prove the accuracy of the research findings through other researcher and participant(s) checking (Creswell 2009). To ensure internal validity in this research, the findings were presented to other researchers and key participants to ensure precision. The findings of this research were also validated through triangulation to ensure internal validity. Finally, all original publications were peer-reviewed through a double-blind review process, strengthening the validity of this research.

External validity refers to the generalization of research findings across different contexts, which is generally difficult to achieve to a higher degree in qualitative research (Yin 2009; Creswell 2009; Bryman 2012). In this research, an external validity test was applied by comparing the findings of this research with existing theories and earlier research. In addition, multiple cases (alliance subprojects) were studied in this research to increase external validity. It is also ensured that all organizations participating in the case projects were included in the research. Interview respondents working in these organizations were carefully selected based on their roles, professional background, and experience in order to get multiple perspectives on the research phenomenon to support external validity.

Construct validity is also referred to as measurement validity in quantitative research, which is concerned with the appropriate development of a measure for a concept under investigation (Bryman 2012). In qualitative research, it could also be achieved through triangulation, e.g., using multiple sources of data or data collection methods (Yin 2009; Jonsen & Jehn 2009). To ensure construct validity, this research is based on multiple sources of data, including workshops, surveys, interviews, and documentation.

Apart from the above, this research also has some limitations. Regardless of the strategy of inquiry adopted in the original publications, all research results and findings are case-specific. Therefore, generalizations require careful attention as the research is confined to a hospital construction project context and a specific project delivery method, i.e., collaborative project arrangement. Apart from this specific project context, other ongoing infrastructure projects in Finland procured through collaborative arrangements could have been included in this research to
have different perspectives on the research phenomenon. In addition, the roles and responsibilities of project internal stakeholders are influenced by the adopted project delivery method. Hence, the research findings related to the roles and responsibilities of project internal stakeholders should not be considered as a general statement as these could change in different project contexts. Then, the research findings related to the stakeholder relationship development, development levels, related challenges, and preconditions are yet to be tested in different contexts and phases of the projects. Furthermore, there are limitations related to the sample sizes of original publications, which could have been increased to achieve the best possible theoretical saturation. Moreover, in some original publications, data were collected during the implementation phase of the project, and prior and subsequent phases were not covered in these studies.

4.4 Recommendations for further research

This thesis focuses on analyzing the networks of stakeholders in large hospital construction projects, developing stakeholder relationships to achieve collaboration among them, and managing stakeholders’ collaboration through different mechanisms. Although this research has theoretical and practical contributions, academic research is always limited in terms of scope and contextual boundaries. Therefore, there are multiple possibilities for further research.

First, there are multiple opportunities to analyze stakeholder networks at the healthcare process level and at the hospital project level. The findings of this research on the level of the healthcare process could be used to generate several propositions and hypotheses for further research in different contexts. At the hospital project level, this research raises several questions for further research. For instance, this research suggests that there are different types of networks – contractual, supply, and information – on the project level. This research reflects contractual networks based on formal alliance relationships that are established following the execution of alliance contracts among project internal stakeholders. Further research could explore contractual networks deeper by including subcontractors and their contractual relationships with project internal stakeholders that could form core–periphery structures. This could help in exploring the interactions between core and periphery groups and their interdependencies in terms of the coordination and control of project stakeholders. Furthermore, the mechanisms involved in the coordination of activities in the supply networks and the information flow in the information networks are not explored in this research,
which could be explored in future research. Moreover, linking the different aspects of these networks – contractual, supply, and information – with project performance would be worth exploring further.

Second, with regard to developing stakeholder relationships from one level to another level in collaborative projects, further research could link these development levels of stakeholder relationships with the progress in terms of different phases of the collaborative projects. Furthermore, these development levels could also be linked with project performance in future studies. Further research could also cover and explain the transition-related activities from one development level to the next level of stakeholder relationships and related issues.

Finally, with regard to the research findings related to the issue of opportunism in large construction projects, further research could test these findings in different contexts of infrastructure projects. Furthermore, the phenomenon of this study could be explored in a wider context by using a multiple case study approach with different theoretical lenses. Since the research context of this thesis is related to a hospital construction program divided into multiple interlinked subprojects procured through multiple project alliances, the study of differences between these alliances is worth further research.
References


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Appendices

Appendix 1: Alliance A – stakeholders and their characteristics
Appendix 2: Alliance B – stakeholders and their characteristics
**First appendix**

Alliance A (Reprinted from Publication II © 2023 Inderscience Enterprises Ltd.).

<table>
<thead>
<tr>
<th>S. Nr</th>
<th>Stakeholder</th>
<th>Label</th>
<th>Activity Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alliance partner and client representative</td>
<td>CEU</td>
<td>Management, architecture, and engineering</td>
</tr>
<tr>
<td>2</td>
<td>Alliance partner and main architect</td>
<td>ATO</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Alliance partner and planning architect</td>
<td>LAO</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Alliance partner and planning architect</td>
<td>UAO</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Alliance partner and project management consultant</td>
<td>AIR</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Alliance partner and structural engineering consultant</td>
<td>AIS</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Alliance partner and electrical engineering consultant</td>
<td>GTO</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Alliance partner and main contractor</td>
<td>NCCSO</td>
<td>Construction works</td>
</tr>
<tr>
<td>9</td>
<td>Alliance partner and building technology contractor</td>
<td>ASOM</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Alliance partner and HVAC contractor</td>
<td>ASOT</td>
<td>HVAC works</td>
</tr>
<tr>
<td>11</td>
<td>Alliance partner and HVAC designer</td>
<td>GKO</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Alliance partner and automation contractor</td>
<td>SOT</td>
<td>Building automation works</td>
</tr>
<tr>
<td>13</td>
<td>Subcontractor for the demolishing and piling works</td>
<td>HVMO</td>
<td>Subcontractors and suppliers</td>
</tr>
<tr>
<td>14</td>
<td>Subcontractor for the wall element assembly</td>
<td>AOA</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Subcontractor for the reinforcement works</td>
<td>NRO</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Subcontractor for the civil works (excavations)</td>
<td>KOJ</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Subcontractor for the waterproofing &amp; roofing works</td>
<td>KOH</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Subcontractor for the masonry works</td>
<td>MNO</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Subcontractor for the sheet metal works</td>
<td>OKO</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Subcontractor for the walls’ construction</td>
<td>SKO</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Subcontractor for the customised cleanrooms</td>
<td>VSA</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Subcontractor for the mobile cranes on site</td>
<td>NAO</td>
<td></td>
</tr>
<tr>
<td>S. Nr</td>
<td>Stakeholder</td>
<td>Label</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------------------------------</td>
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### Second appendix

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