

ACTA

*Aki Aapaoja*

ENHANCING VALUE  
CREATION OF  
CONSTRUCTION PROJECTS  
THROUGH EARLY  
STAKEHOLDER  
INVOLVEMENT AND  
INTEGRATION

UNIVERSITY OF OULU GRADUATE SCHOOL;  
UNIVERSITY OF OULU,  
FACULTY OF TECHNOLOGY, INDUSTRIAL ENGINEERING AND MANAGEMENT





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*AKI AAPAOJA*

**ENHANCING VALUE CREATION OF  
CONSTRUCTION PROJECTS  
THROUGH EARLY STAKEHOLDER  
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Academic dissertation to be presented with the assent of the Doctoral Training Committee of Technology and Natural Sciences of the University of Oulu for public defence in OP-sali (Auditorium L10), Linnanmaa, on 30 May 2014, at 12 noon

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## **Aapaoja, Aki, Enhancing value creation of construction projects through early stakeholder involvement and integration.**

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### ***Abstract***

Nowadays, construction projects are implemented in highly demanding and complex built environments that require multisectoral and multidisciplinary efforts and collaboration between the project stakeholders with divergent interests, objectives, and backgrounds. Successful collaboration is one of the most efficient ways to enhance project value creation and gain better results, especially when it integrates stakeholders with different kinds of expertise and contributions. However, stakeholder management, involvement, and integration have been seen as a difficult issue, particularly in the early project phases, and have frequently resulted in conflicts and partial failures due to the lack of practical tools for managing the stakeholders and understanding their roles. The purpose of this dissertation is to enhance the understanding of how value creation can be enhanced through early stakeholder involvement and integration in the context of construction.

The research applies a qualitative research approach and utilizes the case study methodology. The data for this research was collected through a survey and semi-structured interviews. The results indicate that project value creation can be increased by early stakeholder involvement and integration. However, it demands systematic stakeholder management practices in order to identify the different project-specific stakeholders and their requirements for the project. The results also show that the salience of the stakeholders varies within a project and from project to project, and some of the stakeholders are always more important than others. Nevertheless, all the stakeholders usually have the change to impact on and contribute to the project, positively or negatively. To exploit the expertise of a project stakeholder or to avoid the problems caused by the stakeholders, the framework for stakeholder identification and classification was created in this dissertation.

***Keywords:*** construction, early stakeholder involvement, integrated project teams, project stakeholders, stakeholder integration, stakeholder management, stakeholder salience, value creation



## **Aapaoja, Aki, Rakennusprojektien arvontuoton tehostaminen sidosryhmien aikaisella osallistamisella ja integraatiolla.**

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### ***Tiivistelmä***

Rakennusteollisuuden projektien sekä rakennetun ympäristön muuttuminen yhä dynaamisemmaksi ja monimutkaisemmaksi edellyttää projektin sidosryhmien yhä aktiivisempaa ja syvällisempää osallistamista, yhteistyötä sekä vaatimusten huomioimista projektien määrittelyvaiheesta alkaen. Muilla teollisuuden aloilla sidosryhmien aikaisella osallistamisella projektin alusta alkaen on huomattu olevan positiivinen vaikutus projektien parempaan arvontuottoon ja tavoitteiden saavuttamiseen. Osoitetuista hyödyistä ja joistain hyvistä kokemuksista huolimatta, sidosryhmien osallistaminen ja integroiminen on osoittautunut yleisesti ottaen erittäin vaikeaksi ja haasteelliseksi, erityisesti vaativien ja kompleksisten projektien osalta. Pääsääntöisesti ongelmat johtuvat puutteellisesta toimintavaroista sekä tottumattomuudesta sidosryhmien kokonaisvaltaiseen osallistamiseen ja johtamiseen, mikä on usein johtanut sidosryhmien välisiin ristiriitoihin ja hankkeiden, ainakin osittaiseen, epäonnistumiseen. Tämän väitöstutkimuksen tavoite on tutkia, että miten rakennusprojektien arvontuottoa voidaan parantaa sidosryhmien aikaisella osallistamisella ja integroinnilla.

Tutkimus on laadullinen tapaustutkimus, jonka empiirinen aineisto on hankittu kyselyllä sekä haastatteluilla eri rakennusteollisuuden projekteista. Tulokset vahvistavat käsityksen, että sidosryhmien aikainen osallistaminen ja integroinnilla projektin arvontuottoa kaikille sidosryhmille voidaan tehostaa. Tämä kuitenkin vaatii systemaattisia toimintatapoja ja prosesseja, jotta projektin kannalta keskeisimmät sidosryhmät ja heidän vaateensa kyetään tunnistamaan sekä osaaminen voidaan hyödyntää. Tulokset myös osoittavat, että projektin sidosryhmät eivät ole tasavertaisia keskenään ja heidän keskeisyytensä vaihtelee sekä projektin aikana että projektikohtaisesti. Tästä huolimatta, yleensä kaikki sidosryhmät voivat vaikuttaa, tavalla tai toisella, projektiin joko positiivisesti tai negatiivisesti. Jotta sidosryhmät voitaisiin osallistaa mahdollisimman tehokkaasti, ja näin ollen hyödyntää heidän osaaminen ja välttää ongelmat, luotiin tässä tutkimuksessa viitekehys sidosryhmien tunnistamiseksi, arvioimiseksi ja luokittelemiseksi.

*Asiasanat:* arvon tuotto, integroidut projektitiimit, projektin sidosryhmät, rakentaminen, sidosryhmien aikainen osallistaminen, sidosryhmien keskeisyys, sidosryhmä integraatio, sidosryhmä johtaminen



*Dedicated to my parents, Ritva and Benjamin*



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I never expected that someday I would get a doctoral degree. But here I am now, a part of something, hopefully something noble, glamorous, and maybe a little bit glorious too. The road has not been easy, but as Jedi master Yoda said “do or do not, there is no try.” Well, I did it. However, I could not have reached my goal without the guidance, support, and sacrifices of several people to whom I will always be grateful.

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*“What we do in life echoes in eternity”* (Roman proverb)

Oulu, Finland, April 2014

Aki Aapaoja

## List of abbreviations

BiQ	Built in Quality
DfX	Design for Excellence
IPD	Integrated Project Delivery
IPT	Integrated Project Team
JIT	Just In Time
L	Legitimacy
NBCF	National Building Code of Finland
NGO	Non-Governmental Organization
P	Power
RE	Requirements Engineering
RPDA	Relational Project Delivery Arrangement
RQ	Research Question
S	Salience
TPS	Toyota Production System
U	Urgency



## List of original publications

This dissertation is based on the following publications:

- I Aapaoja A, Herrala M, Pekuri A & Haapasalo H (2013) Characteristics of and cornerstones for creating integrated teams. *International Journal of Managing Projects in Business* 6(4): 695–713.
- II Aapaoja A, Kinnunen T & Haapasalo H (In press) Stakeholder salience assessment for construction project initiation. *International Journal of Performance Measurement*.
- III Aapaoja A, Haapasalo H & Söderström P (2013) Early stakeholder involvement in the project definition phase – case renovation. *ISRN Industrial Engineering*. Article ID 953915.
- IV Aapaoja A & Haapasalo H (2014) A framework for stakeholder identification and classification in construction projects. *Open Journal of Business and Management* 2(1): 43–55.

The author of this doctoral dissertation is the corresponding and primary author of all these original publications. He has also had the primary responsibility for the entire research process, from forming the research problems, reviewing and collecting the theoretical base, and forming the research questions, to collecting and analyzing the empirical data and material. However, the roles and efforts of the co-authors have been valuable and have mainly included reviewing and commenting on the article manuscripts of the corresponding author.



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# 1 Introduction

## 1.1 Background and research environment

During the past few decades, the manufacturing and service industries have significantly increased their value, productivity, quality, and profitability through process improvement techniques, information technologies, and collaboration. Unfortunately, the construction industry is lagging in performance improvement and optimization techniques, and also in delivering projects (Forbes & Ahmed 2011, Glassop 2002, Hayes 2002, Salminen 2005, Koskela 2000). It has been discovered that the project delivery systems of construction projects contain the following problems at a minimum (Merikallio & Haapasalo 2009, Forbes & Ahmed 2011, Pekkanen 2005, Koskela 2000, Virtanen 2009):

- the costs are finally cumulating to the customer,
- major deficiencies in several different fields of know-how (e.g., design, quality, lead time, and predictability of work),
- differences (e.g., process, methods, viewpoints, opinions) between project organization and both internal and external stakeholders are not taken into account in the best possible way,
- functional decentralization and inefficiency,
- inability to collaborate,
- lack of processes to transfer and develop the knowledge and competencies, and
- harsh sub-optimization during the project.

Traditionally, construction projects have been delivered by using methods (e.g., design-bid-build, design-build or design sequencing) that separate the design and construction and in general split the project into small pieces by tendering by the lowest price. It has eventually led to the prevailing practice of ‘over-the-wall,’ where the plans and designs are just given to the next designer or ‘customer’ in the process until the plans are ready without interaction or information exchange. Because no one seeks to support each other, the current practice leads to sub-optimization, where the stakeholders just strive for optimizing their own performance (Matthews & Howell 2005, Pekkanen 2005).

The low-bid syndrome is recognized as a major determinant behind the fragmented and sub-optimized nature of construction (Loraine 1994, Nicholson 1991, Baiden *et al.* 2006, Lahdenperä 2012, Jylhä 2013). Selecting the project

stakeholders and participants solely on the basis of lowest price, all the customer requirements, needs, and constraints cannot usually be taken into account or achieved (Elfving 2003). Through traditional methods, the most capable stakeholders are not typically selected, and hence the knowledge from the other actors in the network cannot be fully exploited. Furthermore, there has usually been a tendency to rush to detail design without the proper understanding of the project requirements and objectives, even though these are necessary to create and maximize customer value (Pekkanen 2005, Saarenpää 2010).

Due to the many prevailing challenges, the construction industry has started to seek new methods and practices to deliver projects with higher customer value, higher quality, and more reasonable costs (Moore & Dainty 2001, Forbes & Ahmed 2011, Koskela 2000, Virtanen 2009, Elfving 2003). New methods strive to integrate project stakeholders in the project as early as possible (Elfving 2003). The main purpose of early involvement and team integration is to form the project objective, which needs to be as coherent and realistic as possible, and to which all the stakeholders have contributed. Basically, the new methods can be summed up in five big ideas: 1) collaborate, really collaborate, throughout design, planning, and execution; 2) increase collaboration among all project participants; 3) projects are networks of commitments; 4) optimize the project, not the pieces; and 5) tightly couple action with learning (Lichtig 2006).

These new methods should result in better integration and relational interaction between the project team and the project stakeholders, expose the customers to alternative means of accomplishing their purposes beyond those they have previously considered, and help the customers understand the consequences of their desires (Ballard 2008, Moore & Dainty 200, Elfving 2003). The most well-known of these methods are project alliancing and integrated project delivery (IPD). More recent research (Lahdenperä 2012) refers to these aforementioned methods jointly as *relational project delivery arrangements* (RPDAs).

By using RPDAs, the knowledge base of the stakeholders can be utilized more efficiently (Mitropoulos & Howell 2002), and therefore the project purposes can probably be achieved better. It has been noticed that the use of RPDAs allow for identifying and involving stakeholders earlier than in traditional project deliveries. In addition, it has been stated that early involvement is one of the cornerstones for more accurate value creation (Wikström *et al.* 2010, Elfving 2003). However, in RPDA, the project's and project manager's primary challenge is to consider and balance a variety of stakeholders and their requirements

(Aaltonen 2010, Brady *et al.* 2005). Moreover, each stakeholder has specific requirements with respect to the project, which might create fundamental conflicts with others (e.g., many functions versus a low budget and no overruns (Keinänen 2009).

The ability to understand and manage the roles and requirements of various stakeholders is a critical task for project management (Bourne & Walker 2006, Koskela 2000, Kiviniemi 2005, Pennanen 2004) because its primary role is that of facilitator among various constituencies, as well as collector and packer of the project requirements to ensure satisfactory conditions for all parties (Boehm & Ross 1989). Furthermore, the stakeholders are expected to integrate and collaborate with each other, but also participate more actively and more profoundly in the whole project delivery. Additionally, many studies (e.g., Olander & Landin 2005, Watt *et al.* 2010, Aaltonen & Kujala 2010) have pointed out that stakeholder involvement and integration in the project's early phases may have a positive impact on better value creation and the achievement of the project objectives.

Despite the need, finding the right methods for stakeholder identification, involvement, and integration seems to be challenging (Skaates *et al.* 2002, Kujala *et al.* 2007, Lahdenperä 2009). This especially concerns the Finnish construction industry, where the national building code of Finland (NBCF) (e.g., Building Information Ltd. 1989) sets restrictions on it. For example, it presents the project stakeholders as a single fixed group, although stakeholders and their roles vary from project to project. The main problem is that it has tried to be universally applicable to all kinds of builders and projects, and hence it is too general and inflexible. Additionally, the NBCF is followed and read too literally, and hence it does not leave any space for applying common sense and following one's own course of actions (Saarenpää 2010), which could enhance stakeholder management and involvement.

It can be argued that this kind of static management approach cannot be used in complex and dynamic environments anymore. However, at the moment there are no systematic processes for stakeholder identification and management, and in particular who the involved stakeholders should be, and why they should be involved (Tillman *et al.* 2012, Yang *et al.* 2011, Dietrich *et al.* 2010). In addition, it is vital that the number of key stakeholders is manageable, since complexity increases along with the number of stakeholders. A systematic process can help project management to identify, classify, and manage stakeholders more comprehensively. Therefore, this dissertation is an effort to bridge the gap by

focusing on enhancing project value creation and the stakeholder identification and management process through early stakeholder involvement and integration in the context of construction.

## 1.2 Objective and scope

This dissertation discusses the nature of creating integrated teams in the construction industry by identifying and involving the project stakeholders and their roles in the early project phases. The construction projects involve and touch a great number of stakeholders with different kinds of requirements and expertise. The evidence in the literature points out that one possibility to enhance project value creation and optimize the project results is to identify and integrate customers, suppliers, and stakeholders into an integrated team during the early phases of a project.

The overall objective of this research is an attempt to *provide the evidence for how value creation can be enhanced through project stakeholder identification, classification, and early involvement in the context of construction*. This research consists of four interconnected sub-areas; their interaction is presented in Figure 1.

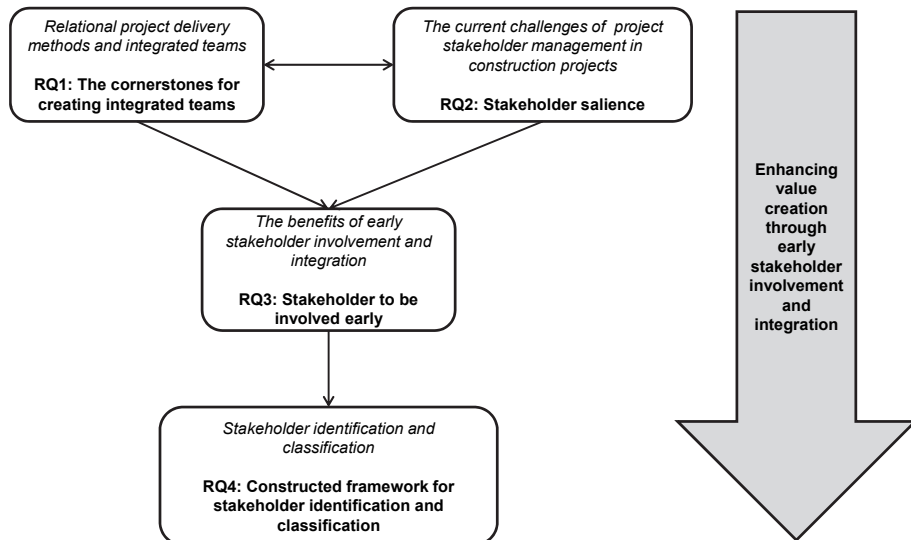


Fig. 1. The research framework.

This research is performed through four research questions (RQ) that are formed for compiling the research findings as a whole (Table 1). In order to meet the overall objective, the research questions must be answered. The positioning of the research questions within the research framework is also presented in Figure 1.

**Table 1. Research questions of this study.**

RQ#	Research question
RQ1	What are the main cornerstones for creating successful team integration?
RQ2	What is the salience of different stakeholders in a case construction project?
RQ3	Who are the stakeholders to be involved and integrated early in the project definition phase?
RQ4	What kind of framework can be used to analyze and classify project stakeholders?

The research questions are formed from four perspectives: the characteristics and cornerstones of creating integrated teams (presented in article 1), the salience of the project stakeholders (article 2), early stakeholder involvement (article 3), and the framework for stakeholder identification and classification (article 4). The research questions are related to each other, and together they strive to reach the objective of this dissertation. Although the focus of the articles is different, together they form a specific subject matter.

This dissertation discusses enhancing value creation and achieving project purposes more effectively in construction projects through integrated project teams and early stakeholder identification and involvement. The main focus of this dissertation is on stakeholder integration and interaction, and how project stakeholders should be identified, involved, and managed in order to deliver a successful project to the customer.

The research addresses the research questions mostly with a qualitative approach, but a quantitative approach is applied to some extent in articles 1 and 2. Both a literature review and empirical research are used to answer the research questions, each of which is answered with a journal article (Table 2).

**Table 2. Research papers overview.**

Article	RQ#	Article title	Journal
I	RQ1	Characteristics of and cornerstones for creating integrated teams	International Journal of Managing Projects in Business
II	RQ2	Stakeholder salience assessment for construction project initiation	International Journal of Performance Measurement
III	RQ3	Early stakeholder involvement in the project definition phase – case renovation	ISRN Industrial Engineering
IV	RQ4	Framework for stakeholder identification and classification in construction projects	Open Journal of Business and Management

The first and the second articles study integrated project delivery methods and stakeholder management in construction projects. However, the issues are studied more at the overall level. The main focus of the first article is to discuss how integrated project teams can be identified and what the cornerstones for creating them are. The second article studies stakeholder salience in a construction project in order to understand the salience of different stakeholders related to project decision making and project implementation. In particular, this article discusses the challenges of defective stakeholder management and how the expertise and contribution of the stakeholders could be exploited more effectively.

The third article focuses on understanding the project definition phase in RPDAs and early stakeholder involvement. Because one of the purposes of this dissertation is to show how value creation can be enhanced in construction projects, this article especially aims to identify the most important stakeholders to be involved early and what kind of contribution and value they can offer through early involvement.

The fourth article is somewhat similar to the third article, but rather than the benefits of early involvement, the article focuses more on early stakeholder identification and classification. At the same time, the fourth article forms the constructive part of this research by introducing a structured framework that is designed to identify and classify project stakeholders in order to facilitate an optimal value creation and project outcome by identifying and consolidating the different roles and responsibilities of the stakeholders.

### 1.3 Research process and approach

Scientific research always has its philosophical viewpoint. When the researcher approaches it, he/she faces ontological, epistemological, and ethical questions, like (e.g., Lancaster 2005):

- How can one believe in and know reality based on scientific research?
- How is scientific knowledge obtained and when is this knowledge scientific?
- When does a researcher abuse his research object or act unethically against the scientific community?

Ontology can be understood as a reality where studied phenomena are understood to reside and the manner the studied phenomena position to this reality. Scientific research usually tries to make ontological pre-conceptions on the studied phenomena. Ontology answers the questions: is the reality objective or subjective. Ontological foundation has an impact on the choice of theory and concepts (Anttila 2005, Harisalo 2008).

In this research, a qualitative approach has been taken in which the data from the stakeholders (e.g., customers, end-users, builders, sponsors, developers, designers) have been collected by adopting a qualitative questionnaire and semi-structured interviews. The main reason and motivation for this approach was that the researcher had good access to the opinions, views, and experiences of the respondents. The collected material has been analyzed and the most important findings have been presented. All the conclusions are based on this analysis.

The nature of this research is qualitative and utilizes the principles of empiricism and applies inductive reasoning. The research is empirical and mainly descriptive. However, a constructive research approach and a quantitative research approach are also used in one research paper. All of the other three research papers are based on semi-structured interviews. The research approach is presented in Figure 2.

	Theoretical	Empirical
Descriptive	Conceptual research	<u>Nomothetic research</u>
Normative	Decision-oriented research	Constructive research

**Fig. 2. Research approach (modified from Kasanen *et al.* 1993).**

This research pursues a qualitative research approach in order to enable the interviewees to express their opinions, views, and experiences as freely as possible. The objective of qualitative research aims to describe a studied phenomenon, to understand its functioning and to offer theoretically reasonable interpretations of this phenomenon. The main objective is to describe true life realities. (Denzin & Lincoln 2005, Hirsjärvi *et al.* 2008, Eskola & Suoranta 2008).

Qualitative research gives the researcher some degree of freedom in planning and doing research. However, the researcher is not free from his or her values and limitations, and this may have some impact on the objectivity of the research, because the researcher and the studied phenomena are integral. On the other hand, completely objective knowledge does not exist; to some extent, all research and results are affected by the researcher's understanding. (Hirsjärvi *et al.* 2008, Tuomi & Sarajärvi 2006, Eskola & Suoranta 2008).

When doing research, it is essential to choose a research method that supports the research problem in question. Descriptive research is used when the objective is to increase understanding by describing the processes and objects of the phenomena. Normative research includes collecting the facts and an evaluation of the current state of the phenomena, but it also tries to point out the direction of future development. Normative research produces a theory of practice for professionals, for example, recommendations, rules, standards, and advice (e.g., Olkkonen 1993).

A qualitative research approach aims to understand the studied phenomena and typically utilizes samples that are discretionary to the researcher. The sample sizes of the case studies are not necessarily high in numbers, but are studied thoroughly in order to highlight the quality of the input material. However, the

sample size must cover enough people in relation to the type of analysis and interpretation needed (Eskola & Suoranta 2008).

Empiricism is a theory of knowledge that emphasizes the role of experiences, especially experiences that are based on perceptual observations. It is possible to obtain knowledge through inductive reasoning, which is typical for qualitative analysis that aims to make generalizations and conclusions based on the obtained material. The material is analyzed in multifaceted ways in adequate detail to bring up important themes (Eskola & Suoranta 1998, Manktelow 1999).

#### **1.4 Research strategy and data collection**

This research applies the case study research strategy, which, in general, is a preferred strategy when ‘how’ and ‘why’ questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within a real-life context. Hence, the case study strategy is appropriate for research that covers practice-based problems where the experiences of the respondents are important. This aims to discuss the phenomenon in depth by understanding the true environment (Yin 2009).

This particular research started by studying stakeholder management and challenges in construction projects from a general level with a single case study. After that, the research moved to a more specific area of multiple single case studies in the context of integrated project teams and early stakeholder involvement. The first three research questions strive to create an overall understanding of stakeholder management, integrated project teams, and early stakeholder involvement, but also how value creation can be enhanced by emphasizing and investing in these subjects. The last research question asks what kind of framework can be developed to provide a structured approach to the identification and classification of stakeholders within construction projects.

A single case study is appropriate when the case studied is special to understand and clarify (Voss *et al.* 2002), and therefore it can be considered an appropriate approach for this research also. These studies utilize a single case in order to understand the value and benefit of early stakeholder involvement and integration in construction projects. All of the case projects and the representatives were selected based on Yin’s (2009) criteria of validating case studies and informants. Thus, the case projects and the representatives were selected carefully on the basis of their professional background and expertise. Also, recommendations from the case representatives of other possible

representatives were taken into account. The experience and interests of the representatives ensured their high motivation with respect to the discussed topics. They were also chosen from different roles in order to get different viewpoints and to ensure the quality of this research.

In this research, the data was collected by interviews and one survey. The interviews were semi-structured, and the survey was given via questionnaire with both closed and open questions. The interview method was used because the researcher was able to get as close as possible to the interviewees and the context. In addition, the researcher can interpret that context and its problems from the inside, as it is seen and felt at various points and levels (Schwartzman 1993). Table 3 summarizes the research strategy and data collection methods.

**Table 3. An overview of the research strategy and data collection methods.**

RQ#	Research strategy	Data collection method	Number of respondents
RQ1	Single case study	Questionnaire	25
RQ2	Single case study	Semi-structured face-to-face interviews	8
RQ3	Single case study	Semi-structured face-to-face interviews	8
RQ4	2 single case studies	Semi-structured face-to-face interviews	2

To conclude, this dissertation achieves its purpose through empirical studies, which are conducted in a qualitative manner. The literature and the previous research were studied to gain a deeper understanding about the topics, phenomena, and theories, in order to use them as the knowledge base for the empirical study. This dissertation's empirical research was conducted as single case studies. The first article describes the questionnaire method that was used to clarify and evaluate the matter more precisely with regard to the characteristics of team integration. The empirical material of the second and third articles was collected through semi-structured interviews with project participants and experienced construction specialists. The fourth and last article included two single case studies. The object of using two single cases was to gain more precise information and evaluate the accommodation of the created framework to the different kinds of construction projects.

## 1.5 Key concepts

There are a few key concepts that this research utilizes through its course: Lean construction, relational project delivery arrangements (RPDAs), integrated project

team (IPT), stakeholder approach, requirements engineering (RE), and early involvement.

1. The Lean production philosophy is a management methodology that was developed on the shop floors of Japanese car manufacturer Toyota (Womack *et al.* 2007). Originally, the primary emphasis was on reducing internal waste from production processes, but Lean has evolved over time, and nowadays Lean seeks to enhance value for customers and links value to customer requirements, rather than just reducing costs (Hines *et al.* 2004, Pekuri *et al.* 2012). Lean construction applies the Lean philosophy, theory, and tools in construction, and is a new way to design and build capital facilities but also to manage construction projects. Lean construction produces significant improvements, particularly for complex or uncertain projects, or projects with a tight schedule. Moreover, like project team integration, Lean philosophy and Lean construction aim to integrate project processes and working practices in order to achieve more effective teams and project deliveries. In this research, Lean construction aims to maximize value and minimize waste throughout the construction process.
2. Relational project delivery arrangements (RPDAs) are project delivery models, used especially in large and complex projects, where the customer and non-owner stakeholders work together as an integrated, collaborative team in good faith, acting with integrity and making unanimous, best-for-the-project decisions, managing all project delivery risks jointly, and sharing the outcome of the project. The methods integrate people, systems, business structures, and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction. The most well-known RPDAs are project alliancing and integrated project delivery (IPD).
3. An integrated project team (IPT) is a team that is formed from the customer's project team and the supply team of consultants, constructors, and specialist suppliers. IPT brings together the design, construction, and maintenance activities and competencies, and the purpose is to involve and exploit valuable input from all parties in the supply team. (OGC 2003, Brady & Davies 2011). Baiden *et al.* (2006: 14) define IPT as a team that brings together "various skills and knowledge, and removes the traditional barriers

between those with responsibility for design and construction in a way that improves the effective and efficient delivery of the project.”

4. “Stakeholders are people, groups, and parties who are directly or indirectly involved or impacted by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively” (IFC 2007: 10). A stakeholder approach refers to the necessity for an organization to manage the stakeholder groups in an action-oriented way (Freeman 1984) through stakeholder identification, classification, and analysis (Cleland 1986).
5. Requirements engineering (RE) is a process that aims to understand stakeholder needs, identifying what the project intends to achieve and ensuring that the stakeholders build a product that satisfies those needs at minimum cost and time (Kotonya & Sommerville 1998, Asghar & Umar 2010). However, in order to maximize project value creation through stakeholder management and analysis, the project management must deal with the different stakeholder requirements. In this research, RE is understood as a process through which the project stakeholder needs (or requests) are translated into requirements (that satisfy the needs).
6. Early involvement aims to involve the construction project stakeholders (e.g., designers, contractors, and maintenance) earlier in the planning process, or even in a project definition phase, in order to maximize the benefit received from the stakeholders’ capabilities (Trent & Monczka 1999). The primary purpose of early involvement is to share the goal of integrating the planning processes (‘lifecycle perspective’) (Valkenburg van *et al.* 2008), and hence take stakeholders’ requirements into account better. Early involvement is closely related to IPT and RE, because it aims to increase collaboration, interaction, and knowledge sharing between stakeholders, and thus it enables a more effective requirements engineering process. Early involvement has been used in the high-tech industry for years and it is related to other terms, like early supplier/contractor involvement (Valkenburg van *et al.* 2008, Wynstra *et al.* 2000). However, it is a relatively new approach in the construction industry.

## 2 Theoretical foundation

### 2.1 Theoretical framework

The theoretical foundation of this dissertation is based on four theoretical main areas: Lean philosophy, relational project delivery arrangements, stakeholder approach, and requirements engineering. These theories and concepts are applied to the extent required to gain a better and sufficient understanding about the enhancement of value creation through early stakeholder involvement and team integration in RPDA and construction projects. Figure 3 illustrates the theoretical framework of this research. The area inside the dashed line illustrates the concepts to be studied in this research. The outside area is out of scope, but the concepts within come from related research and will therefore have some bearing on the current study.

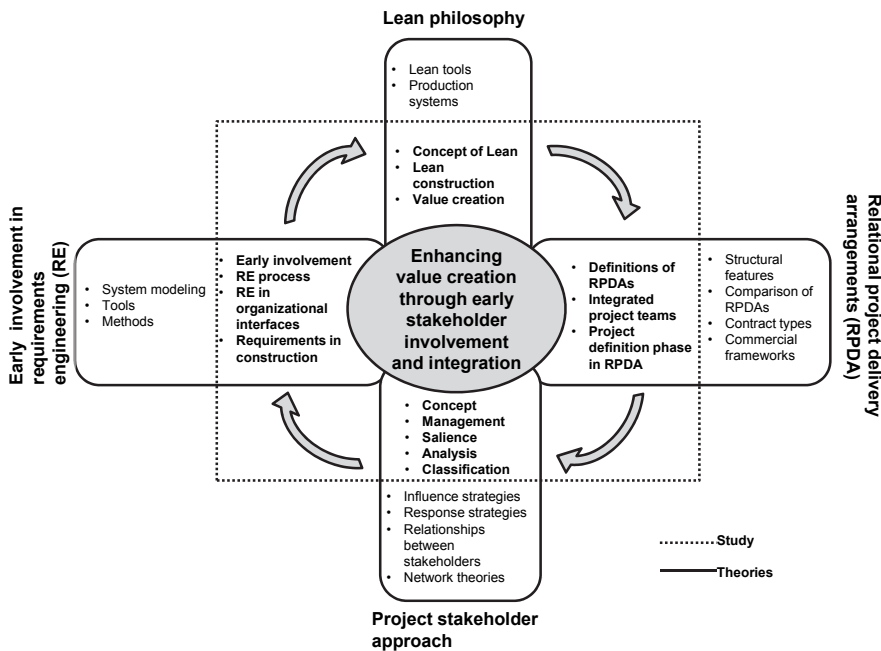


Fig. 3. Theoretical framework of this dissertation.

To achieve the purpose of this research and understand how early involvement and team integration can be used in enhancing value creation, the Lean

philosophy and its application in construction ('Lean construction') must be discussed and understood first in order to create a background for this research. Maximizing customer value and minimizing the waste (unnecessary actions) in processes are most crucial (Liker & Lamb 2001, Womack & Jones 2003, Koskela 2000, Elfving 2003). Therefore, in this dissertation, Lean is considered to be a fundamental concept that acts as a foundation and cornerstone for the more effective and accurate value creation that can be achieved through stakeholder involvement and integration. Because of that, Lean is discussed on the ideological level, and hence, specific Lean tools and production systems are not included in this research. Additionally, within the Lean construction literature, integration is an evolving field that is being heavily promoted as a means of project delivery (e.g., Koskela 2000, Elfving 2003, Ballard 2008, Jørgensen & Emmitt 2009).

Because RPDA's have been seen as an effective way to realize the philosophy and ideas of Lean in construction by integrating stakeholders and create high customer value (Tillman *et al.* 2012, Jørgensen & Emmitt 2009, Matthews & Howell 2005, Lichtig 2006), it is vital to include RPDA in this research. The RPDA area includes the nature, phenomena, and features of RPDA and team integration. In addition, the different types of RPDA, the characteristics of integrated teams and effective teams, and the different phases of project definition in RPDA are studied (e.g., Lahdenperä 2012, Cohen 2010, Thomsen *et al.* 2009, AIA 2007).

Projects and project teams, especially RPDA's and integrated project teams, impact and are impacted by the great number of different project stakeholders. In other words, the project stakeholders are the ones who express the needs and requirements for the project, and hence they may have a significant contribution to the project. Construction projects contain a variety of different stakeholders besides the project team, many of which may be specific to only that project (e.g., Freeman 1984, Mitchell *et al.* 1997, Elfving 2003, Bourne 2005, Aaltonen 2010). Therefore, it is necessary to discuss how the stakeholders can be understood and managed. In this research, the stakeholder approach includes the concept of stakeholder and the key areas of stakeholder approach, for example, stakeholder management, analysis, classification, and salience.

Solutions and decisions made in projects are always based on the requirements presented by some stakeholders (Grady 1999, Kiviniemi 2005, Distanont 2013). When the requirements are presented, they are rarely ready to implement; first, someone has a need that develops into a request, which can be analyzed and ultimately translated into a requirement (Wieggers 2003, Kotonya &

Sommerville 1999, Distanont 2013). However, there can be various ways, and some are better than others, to put requirements into action that ultimately has an influence on the value creation of the project (Lawrence 1997, Pennanen 2004, Kiviniemi 2005). Therefore, this research also applies the theory of requirements engineering to point out the importance of a systematic requirements engineering process and its relation to project stakeholder management and involvement. In this research, early stakeholder involvement and interaction are the most suitable ways to elicit engineering needs and requirements.

Overall, this chapter provides a review of the relevant literature and theories applicable to this research. This chapter reviews the literature and considers the existing studies and theories in order to clarify the content and purpose of this research to the readers. However, to keep this research as explicit and coherent as possible, many sub-areas of theory have been omitted from the discussion because they are not considered relevant.

## **2.2 Lean philosophy and Lean construction**

Lean production is a philosophy created by Japanese car manufacturer Toyota, whose main idea was to produce high quality products with a small amount of resources (Womack *et al.* 2007). Lean is about doing more with less – less human effort, less equipment, less time, less space – while pursuing getting closer to what customers really want (Womack & Jones 2003). Lean production and Lean thinking focus on creating and maximizing customer value with as little waste as possible. The philosophy of Lean has now spread all over the world; other businesses outside of car manufacturing are also implementing its practices, and it has gained a lot of attention in the field of construction. (Liker & Lamb 2001).

Lean is a production philosophy that shortens the lead time from customer order to product delivery by eliminating sources of wasteful activities. The cornerstone of Lean philosophy is the Toyota Production System (TPS), which is sometimes used to describe the Lean concept. The main pillars in the Toyota Production System are Just in Time (JIT) and Built in Quality (BiQ), which include the elimination of inventories and other waste through small lot production, reduced set-up times, semiautonomous machines, collaboration with suppliers, employee empowerment, and other techniques (Liker & Lamb 2001).

The biggest difference between Lean/TPS and other production approaches is their underlying understanding of mankind and human motivation (Liker 2004). Lean thinking provides a way to make work more rewarding and satisfying by

changing the ‘wasteful’ activities into value-adding ones. The five principles of Lean are described by Womack and Jones (2003):

- Value: Define value from the customer’s point of view.
- Value Stream: Identify the entire value stream for each product to expose waste.
- Flow: Make the value-creating activities flow.
- Pull: Let the final customer pull value from its source.
- Perfection: Strive for perfection; create a learning organization through continuous improvement.

### **2.2.1 Lean construction**

Lean construction is about applying Lean principles, methods, and tools to the construction industry, but Lean construction is still lacking a universal definition (Jørgensen & Emmitt 2009). However, Lean construction can be understood to some extent as “a production management-based approach to project delivery – a new way to design and build capital facilities. Lean production management has caused a revolution in manufacturing, design, supply and assembly. Applied to project design and delivery, Lean changes the way work is done throughout the delivery process. Lean Construction extends from the objectives of a Lean production system – maximize value and minimize waste – to specific techniques, and applies them in a new project delivery process” (LCI 2013).

In other words, Lean construction aims to meet customer demands better and improve the interaction in the architectural, engineering, and construction process. To achieve it, new principles and methods for product development and production management specifically tailored to the construction industry have been developed, and the means of Lean production that proved to be successful in the manufacturing industry have been applied (LCI 2013). To summarize, the results of applying Lean in construction are (LCI 2013):

- The project delivery processes are designed together to support better customer purposes and value.
- Work is structured throughout the process to maximize value and to reduce waste.
- Efforts to manage and improve the total project performance are made, not just to reduce the costs or increase the speed of the project.

- Project control is about ‘making things happen,’ not about redefined ‘monitoring results’ – from reactive to proactive behavior.
- The reliable release of work between specialists in design, supply, and assembly assures that value is delivered to the customer and waste is reduced.

Lean construction provides roots for operations based on project delivery systems, and it is a good way to manage complex, uncertain, and unique construction projects (Howell 1999). Bertelsen and Koskela (2002) demonstrated Lean management in construction through three concepts: flow, transformation, and value. They described the interconnections between the concepts with contract management, process management, and value management. Contracts management focuses on customer-supplier relationships by striving towards motivation and bonuses rather than claims and penalties. Process management aims at efficient and predictable process flow with a minimal number of errors. This emphasizes the importance of collaboration between the project team and stakeholder. Value management ensures that the tasks performed in order to produce goods and services match the customer requirements and project purpose and hence create customer value, which is the most important thing (Bertelsen & Koskela 2002).

### *The concept of value and value creation*

The ultimate purpose for a buyer and seller/supplier engaging in a relationship is to work together in a way that creates value for them. Sometimes value is just defined monetarily, whereas nowadays a broader definition is more popular which also includes non-monetary revenues, such as competitive advantage, competence, market position, and social rewards. In short, value is a relationship between benefits and sacrifices. (Walter *et al.* 2001, Möller & Törrönen 2003, Ahola *et al.* 2008, Barima 2009).

Walter *et al.* (2001: 66) have defined value “as the perceived trade-off between multiple benefits and sacrifices gained through a customer relationship by key decision makers in the supplier’s organization. Those benefits and sacrifices can result from the relationship under question as well as from connected relationships on which the focal relationship has an impact or is affected by those other relationships.”

Some studies on value creation and Lean construction (e.g., Möller & Törrönen 2003, Ahola *et al.* 2008, Jørgensen & Emmitt 2009) have argued that

benefits and sacrifices are not always immediate, but may take a longer period of time to realize, and therefore value is time-dependent. To avoid short-term optimization, buyers should consider both short-term and long-term benefits and sacrifices. Table 4 briefly illustrates short- and long-term benefits and sacrifices in buyer-seller relationships.

**Table 4. Short- and long-term benefits and sacrifices in buyer-seller relationships (modified Ahola *et al.* 2008).**

Timeframe	Benefits	Sacrifices
Short-term	Product-related (e.g., performance)	Direct costs
	Delivery efficiency	Indirect costs of poor performance
	Additional support services	Operational transaction costs
	Access to resources	
	Innovations	
Long-term	Relationship between customer and suppliers	Strategic transaction costs
	Innovation	Customer capabilities
	After-sales services	

The majority of the current research on value is focused more on value creation than on the concept of value itself (e.g., Walter *et al.* 2001, Möller & Törrönen 2003, Ahola *et al.* 2008, Jørgensen & Emmitt 2009). However, it should not be forgotten that value creation must always be a win-win situation and the supplier needs to offer value to the customer but also needs to gain benefits from the customer at the same time (Walter *et al.* 2001).

Value creation itself may be considered to comprise three phases: value identification, value proposition, and value delivery (Murman & Allen 2002). In the first phase, value identification, the project stakeholders, including their values and needs, are identified. When the different interests are identified, the value proposition phase combines them and forms collective purposes and objectives for the project. The customer and stakeholder perspectives of value are often misunderstood by each other in the group process. It is therefore important to have an effective delivery process to merge the different needs and objectives.

The value chains of current construction projects are complex and include multiple different stakeholders, and thus the concept of value plays a central role in construction project deliveries (Barima 2009). In the current value chains, stakeholders no longer solely create value, and thus they want to open up the possibility of contributing to value creation together with other stakeholders.

However, according to Pekkanen (2005), creating value demands that the project stakeholders' processes are compatible in order to exploit and benefit from the expertise and resources of all the stakeholders. Ramaswamy and Gouillart (2010) have called this situation value co-creation. It is about redefining the process and methods, and redefining how organizations involve stakeholders by bringing them into the value stream and value creation process and involving them in it. Basically, value co-creation adds the perspective of project stakeholder collaboration and involvement into the concept of value creation, and at the same time, shifts the mindset from a traditional 'subsystem delivery' to 'system ensemble and experience co-creation'.

### **2.3 Relational project delivery arrangements and integrated teams**

The growing emphasis on meeting customer needs and enhancing project value creation with increasingly tight schedules has increased the use of integrated teams and project delivery methods (Moore & Dainty 2001, Brady 2011). Traditionally, construction projects start from the premise that the customers know what they want and what they need. Project implementation nowadays, however, is more than implementing an extensive set of features. Customers do not seek products or services in themselves, they want solutions that support their processes and create value when used (Kauppinen *et al.* 2009).

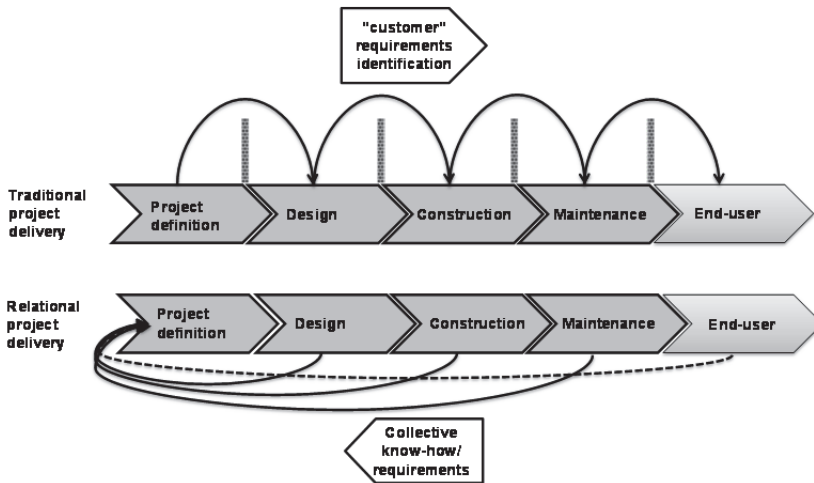
Therefore, the task and trend of project management today is to challenge the customer's self-understanding about the project's objectives, reveal conflicts between the customer and the other stakeholders, and confront the customer's desires by exploring alternatives that were not previously considered (Tillman *et al.* 2012, Ballard 2008). New trends, such as RPDAs, help to expose the customer to alternative means of accomplishing their purposes beyond those they have previously considered, and to help the customers understand the consequences of their desires (Ballard 2008). Because of the prevailing challenges, the construction industry has started to seek new project delivery methods (Davies *et al.* 2007, Brady & Davies 2011). The industry needs more interactive collaboration between project team members and other stakeholders, because more active and deeper project team collaboration and management are essential in creating high customer value (Pekkanen 2005).

### **2.3.1 The nature of and the common types of RPDAs**

In the construction industry, traditional project delivery methods (e.g., design-bid-build) have mainly been based on bilateral contracts and the lowest bid. The chains of bilateral contracts and the low-bid syndrome lead to the fragmentation of the project supply chain, where the project stakeholders try to optimize their own operations and risks only (Lahdenperä 2012, Pekkanen 2005). This results in adversarial relationships between the stakeholders where the stakeholders are not working innovatively together and towards the customers' and projects' objectives (CII 1996, Pekkanen 2005).

The prevailing practice can be called an 'over-the-wall' practice. In such a practice, the plans are given to the next designer or another stakeholder in the process until the plans are ready. Because no one seeks to support each other, this practice leads to sub-optimization, where the stakeholders just strive for optimizing their own performance (Matthews & Howell 2005, Pekkanen 2005). Furthermore, there is a tendency to rush into the details of the design without a proper understanding of the premises.

RPDAs have been widely offered as a solution to increasing value creation, not only for the customer but for the other project stakeholders as well (Dainty *et al.* 2001, Jørgensen & Emmitt 2009). RPDAs' popularity arises from their perceived ability to bring customer, design, and construction processes closer together (Moore & Dainty 2001). Particularly, RPDA challenges the traditional system by contrasting the customers' purpose and what they want against the means (how it is done) and constraints (e.g., budget, regulations, time) (Whelton 2004). In addition, RPDAs are leaning to the integrated project teams, and it has been noted that such teams have had a positive impact on project outcomes (Lahdenperä 2012, Cohen 2010) because such teams enable projects to utilize the knowledge base of the different stakeholders more precisely and effectively (Mitropoulos & Howell 2002, Pekkanen 2005). Figure 4 summarizes the differences between traditional project delivery and relational project delivery arrangements.



**Fig. 4. The ideological difference between traditional and relational project delivery (Aapaoja et al. 2013a).**

Generally speaking, the effectiveness of RPDAs is mainly based upon relationships, openness, honesty, and trust between the project stakeholders (Moore & Dainty 2001). Moreover, the responsibilities and benefits are split fairly and transparently, and thus the project delivery methods are called ‘relational’ as opposed to ‘transactional’ (Lahdenperä 2012). Through a relational approach, instead of transactional, unforeseen events that would increase project costs can be responded to with a more flexible and rapid reaction.

In traditional project delivery methods, the contracts play a major role in RPDA. However, in RPDA, the contract is created for delivering an entire project, not pieces. By doing this, the focus can be shifted from the sub-optimization to the overall optimization of the project. Second, the contract encompasses all the major stakeholders required for the project delivery. This means that other types of relational contracts can be excluded from the review, because they cover partial contracts only. In particular, it must be emphasized that the contract in RPDA does not refer just to stakeholders’ responsibilities; it encompasses a more comprehensive philosophy involving various views, ideas, and protocols guiding the whole project lifecycle (Lahdenperä 2012).

Based on the criteria described above, three comprehensive RPDAs can be identified from the current construction literature: project alliancing, integrated project delivery (IPD), and project partnering. The following definitions are

examples among several definitions, but they put across the collaborative nature of the models and the involvement of the project stakeholders.

Project alliancing is a project delivery and procurement model of major capital asset delivery where the customer and non-owner stakeholders work together as an integrated, collaborative team in good faith, acting with integrity and making unanimous, best-for-the-project decisions, managing all project delivery risks jointly, and sharing the outcome of the project (DTF 2006, Lahdenperä 2012).

IPD is a project delivery and procurement method distinguished by a contract between the owner, design professional, and builder, at a minimum, where risk and reward are shared and stakeholder success is dependent on project success (Cohen 2010, Thomsen *et al.* 2009). The method integrates people, systems, business structures, and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction (AIA 2007).

Project partnering is a long-term commitment between two or more parties for the purpose of achieving specific business objectives by maximizing the effectiveness of each partner's resources. The relationship is based on trust, mutual purposes, an active search for continuous improvements, and an understanding of each other's expectations and values. (CII 1996, Bennett & Jayes 1995).

However, unlike in project alliancing and IPD, in partnering the teams are working under traditional arrangements (Ross 2003), and therefore partnering nowadays is often used to describe the collaborative and relational project methods in general while alliancing and IPD are forms of it (Lahdenperä 2012, Broom 2002, Bresnen & Marshall 2000). Thus it can be argued that only alliancing and IPD are the actual and practical forms of RPDAs.

Project alliancing originated from Australia, where it has been used mainly in big budgets over 100 million, such as infrastructure projects, and IPD is from the USA, where it is usually applied to big health care construction projects. Although alliancing and IPD were geographically determined, at the ideological level they are about the same thing, and the methods and practices have largely been adopted from each other (Lahdenperä 2012). However, at a more detailed level, differences can be found between those two methods.

The main difference between IPD and project alliancing is the inclusion of Lean tools and management approaches and the use of building information

modeling (BIM) in IPD (Lahdenperä 2012, Lichtig 2006). As to team selection, in project alliancing, there is a standardized process for selecting the best team (including the key stakeholders), while in IPD projects the team members are typically selected separately (Lahdenperä 2012, Lichtig 2006). Also, the integrative and collaborative formal contract, which is compulsory in alliances, while in IPD projects it is not, is identified as a difference. In alliance projects, there are separate contracts for the development and implementation phase (Ross 2003). Contracts are often used in IPD projects as well, but they consider the whole lifecycle of the project (Lichtig 2006). Furthermore, the IPD contract allows for the involvement of numerous subcontractors under the same contract conditions (Lahdenperä 2012), even during different phases of the project.

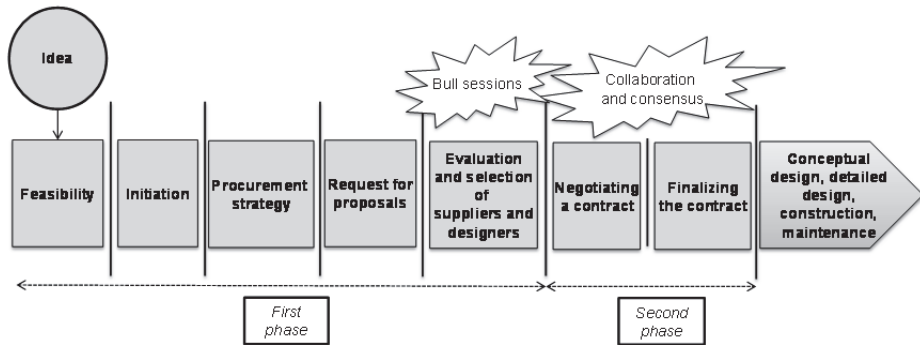
The aforementioned differences have an influence on the content and form of the contracts. Alliance contracts are couched in terms of ‘we’ and rest upon the formal incentives and commercial terms (Ross 2003), while IPD contracts rest more upon soft and flexible values that foster communication, creativity, and collaboration, but also encourage and reward behavior that increases project value (Ashcraft 2010, Lichtig 2006). On the whole, it is more about technicalities than true differences, and as it was mentioned, there may be no actual difference between IPD and project alliance (Lahdenperä 2012). In this dissertation, the term *relational project delivery arrangement* (RPDA) illustrates both project alliance and IPD, unless otherwise stated.

### **2.3.2 The early project phases in RPDA**

The challenges of construction are confronted in the early phases of the project, particularly during the project definition phase, where the project’s purposes to meet the stakeholders’ and project’s needs are defined. The project definition answers the question ‘what’ and it should determine project and customer purposes that can, in later project phases, be translated into criteria for generating and assessing alternative design solutions and concepts (Whelton 2004). Thus, the foundation for the customer value is created in the early project definition phase. This is why the project definition phase and early stakeholder involvement have such a vital role in RPDA.

The process illustrated in Figure 5 complies with the theory and project definition processes that are familiar from RPDAs. The seven different phases of the process are:

1. feasibility,
2. initiation,
3. procurement strategy,
4. request for proposals,
5. evaluation and selection of suppliers,
6. negotiating a contract, and
7. finalizing the contract.



**Fig. 5. An overview of the project definition phase in RPDA (Aapaoja et al. 2013a).**

The project definition phase contains two major phases; the first five stages form the first phase and the last two stages form the second one. The first phase is primarily managed and steered by the customer, while the second phase is performed along with the other selected project stakeholders, such as the designers and contractors. Although the phases are steered by the customer and the major stakeholders, there are plenty of other stakeholders that should be involved in the different phases of the project's definition.

### *Idea and project feasibility*

The project begins with the feasibility study, which examines if the project is feasible for the customers. In the first phase, the idea for the project is explored and elaborated, so that the nature and scale of the project can be clarified and made as accurate as possible. Additionally, the customer should evaluate and discuss if the nature and possible execution of the project is familiar to them and to the suppliers or if it is exceptionally complex and includes a lot of uncertainty. If the project seems to be familiar and simple enough in every way, it will

probably be easier and more natural to use traditional project delivery methods, instead of RPDA.

But then, if the project is going to be special and multidimensional, which would probably require deep and active stakeholder involvement, utilizing their competence as a means of maximizing value creation, then using RPDA would be highly recommended. At this point, the customers should clarify their own purposes and objectives for the RPDA project, such as: the ultimate purpose of the project, the kinds of benefits that using RPDA is expected to achieve, the constraints that need to be taken into account, and so on. The general purposes of RPDA, in addition to the customer's purposes, are (Lichtig 2006, Ross 2003):

- To enhance and improve collaboration between the stakeholders, especially between the customer and the design and construction teams.
- To create the plans for the different project phases within the integrated team.
- To manage the project as networks of commitments.
- To optimize the whole outcome of the project, not the pieces of it.
- Aim for continuous improvement by linking learning into every action.

### *Initiation*

The purpose of the initiation stage is to evaluate the project's feasibility and suitability from the different stakeholders' points of view. Hence, it is essential that the customer identifies and analyzes the potential project stakeholders who may have a positive influence on the value creation of the project and who may have special competencies to be exploited during the project. Naturally, those who can impose constraints must be identified as well.

Typically, related to their complex nature, RPDA projects include a lot of contingencies compared with traditional projects. Different decisions must be made, for example, who is going to put the project into practice, who the stakeholders to be involved are, and whether the project has a sufficient base of support among those who are involved. Additionally, questions are asked about the positions, interests, impacts, interrelations, networks, and other characteristics of the stakeholders, with reference to their past and present positions, but also to their future potential (Freeman 1984, Brugha & Varvasovszky 2000).

The stakeholders enter a temporary relationship with each other during the initiation stage. Hence it is vital for all stakeholders to highlight the effort and involvement required for successful project completion. Typically, in the initiation

stage, misunderstandings and conflicts arise because the involved stakeholders have different expectations and alternatives. However, it is important to work out these disputes so that complications can be avoided later.

### *Procurement strategy*

In RPDA projects, suppliers are typically evaluated and selected according to their capabilities and ‘RPDA competence,’ and therefore the aim is not to find the cheapest option, but the most economically advantageous one. That is why the selection criteria emphasize softer factors than just hard cash.

The selection process and evaluation criteria are adjusted to suit the particular circumstances for each project. Nearly always, the criteria is a combination of capability and price, but capability is weighted (e.g., 75% vs. 25%). The capability of a supplier can be evaluated in several areas, for example, financial capacity, legal obligations, RPDA competence, technical capability, references, and organizational and project management procedures (Lahdenperä 2009).

The contract types and tendering are other essential issues of the procurement strategy that should be decided, especially the decision about how tendering is managed and what it encompasses. There are two ways to handle the tendering: potential proponents can be invited separately to tender, or the proponents can be asked to form a consortium that contains the most critical stakeholders for carrying out the project.

There are also two different ways to create a contract: bilateral or multi-party. In a bilateral contract, the developer creates separate contracts with the general contractor and the main designer (architect). A multi-party contract is a single contract that is signed by both the general contractor and the main designer. The latter is recommended and also preferred, because a multi-party contract is less prone to inconsistency. Additionally, the process of negotiating a contract jointly deepens the proponents’ understanding about the other’s interests and increases the commitment to jointly defined goals (Ashcraft 2010, Ross 2003).

Due to the diverse nature of RPDA projects, the proponents typically form a consortium that carries out the whole project. Therefore, it is in the customers’ interest to give the industry (proponents) as much information as possible about their intention to use RPDA. With that information, the proponents can start identifying and building their integrated team before the customer issues the request for proposals. For example, the information can include estimates of the project scale, scope, and timeframe (DTF 2006).

### *Request for proposals*

Establishing a selection panel is the first step in the development of the request for proposals. Depending on the size of the project, the panel usually contains three and six members who are also prospective members of the customer's RPDA team. The reason for this is that they are likely to be more interested in the project and want to get to know the people they are likely to be working with. Using an external advisor is preferred, just to make sure of the objectiveness of the panel.

Additionally, the panel must confirm the previously outlined selection and evaluation process and the criteria to be announced in the request for proposals. Naturally, the criteria must be in line with the project objectives in order to get suitable proposals (DTF 2006).

### *Evaluation and selection of suppliers and designers*

In traditional project delivery methods, the proponent selection process is usually based on written submissions only, while in RPDA projects the evaluation of the tender is just the first step. Once the submitted proposals have been received and evaluated, the selection panel selects a couple of the best proponents to invite to the next round, which is usually carried out by interviews or workshops. It is also possible that both are arranged, but then only the best proponents proceed to the workshop 'phase.'

The interviews offer the selection panel a chance to meet the proponents and to gain a better understanding about them. The panel also has an opportunity to evaluate the proponents against the criteria more accurately, and hence the ambience of the interviews should encourage an open discussion. If the customer also wants to arrange the workshops, the panel usually selects the two highest ranked proponents to attend them (DTF 2006).

The axiom of the selection workshop is the same as with the interviews, to bring the customer and proponents together. However, in the workshops, the baseline is that the participants will eventually deliver the project, and hence form an integrated project team. Basically, the project has already started during this workshop, and hence the objective of the workshops is to identify the proponent team with the greatest potential (DTF 2006, Ashcraft 2010).

### *Negotiating a contract*

Once the best proponent has been selected, the customer and proponent start negotiating a contract. The negotiations strive to find the alignment of the customer's and proponent's interests, not to determine the contract's (juridical) language. Finding common interests and purpose is the first step in collaborative negotiation, and then comes the contract's language. Otherwise, the contract's language could divert attention away from the project's fundamental issues (DTF 2006, Ashcraft 2010).

The negotiation process contains two sections. First, the outcomes and objectives (and any constraints lying behind them) that the stakeholders want to achieve are defined. Then the processes and rules that are needed to achieve the previously defined objectives must be determined. Usually, the processes require using BIM and Lean tools, such as Big Room, Last Planner, set-based design, standardized work, and target value design (DTF 2006, Thomsen *et al.* 2009). The common rules are:

- speak freely and express your thoughts,
- listen to other people and respect their opinions,
- encourage innovativeness,
- commend when deserved,
- challenge yourself and others, and
- accept the consequences of your actions.

### *Finalizing the contract*

The goal of contract finalizing is to ensure a project where all participants benefit by its success and are equally motivated to avoid its failure. The commitment to the project objectives is assured by a commercial framework and contract terms (Ashcraft 2010).

The commercial framework culminates in the target cost estimate and risk/reward share arrangements, where typically the customer bears 50% of the risk/reward and the other 50% is distributed among the other formal stakeholders (contractors and designers) (Ross 2003). The common terms of RPDA contracts are (Ross 2003, Ashcraft 2010, Thomsen *et al.* 2009):

- the team has a mutual focus and objectives, 'we win or lose' together,

- collective responsibility for the project's performance and productivity, and pain/gain sharing,
- only 'best-for-the-project' decisions are made,
- a 'no-blame' culture and reduced liability exposure,
- open-book accounting and transactions, and
- the project is jointly controlled by the core group.

Despite the contract type (bilateral or multi-party), typically, the customer, general contractor, and main designer form the project core group. It controls the project jointly, and therefore it has the final responsibility for the project and its decisions. However, there are plenty of other stakeholders in the project as well. In RPDA, they can be involved and incorporated into the contract in order to energize and spur them on.

Stakeholders can be incorporated by two ways: a subcontract and a joining contract (Ashcraft 2010). In a joining contract, the key subcontractors and consultants execute a contract that amends the RPDA contract to add them as parties. The risk/reward provisions are amended with each added party to reflect the amount of compensation the added party has placed at risk.

In a subcontract, the key RPDA terms flow through the prime contract (designer or contractor) into the subcontract (subcontractor or consultant). The risk/reward compensation is a portion of the risk/reward compensation of its respective prime. Typically, the subcontractors and consultants have rights to vote at the project management level. Naturally, their opinions are listened to and considered as per the common rules of the RPDA. The project proceeds to the development phase just after the contract has been signed. The development phase now contains different levels of designs (e.g., conceptual, detail), and more accurate budgeting and scheduling that are developed jointly.

Early stakeholder and team identification, involvement, and integration are highlighted as one of the cornerstones of RPDAs (Baiden *et al.* 2006, Lahdenperä 2012). The most essential stakeholders should become involved when their involvement benefits the project most, and typically this is always earlier than in traditional delivery methods. Therefore, 'early' points out this change in practice (Ashcraft 2010), and involvement should take place during the project definition phase, when the project purposes are being developed and determined. Additionally, key stakeholders may have their own needs, interests, and contributions to the project that should be taken into account as early as possible.

In sum, the project definition process in RPDA facilitates the early involvement and creation of integrated project teams. In particular, it aims to optimize value creation and project outcomes by identifying and consolidating the different roles, responsibilities, and objectives of the stakeholders.

### ***2.3.3 Integrated teams in construction***

A team is a small number of people with complementary skills, who are committed to a mutual purpose, performance objectives, and approach for which they hold themselves mutually accountable (Katzenbach & Smith 1993), whereas teamwork is the cooperative and coordinated efforts of organizations and individuals with different features and cultures working together in the interest of their mutual cause (Baiden *et al.* 2003, Forques & Koskela 2009). Hence, effective teamwork requires the sharing of expertise and knowledge, and the playing of multiple roles (Ingram *et al.* 1997). Highly effective teams have proven that they can establish good working relationships and achieve greater outcomes that exceed standards, and thus enhance overall productivity, since conflicts within the teams are minimized (Azmy 2012, Demkin 2008).

The biggest difference between teams and other forms of working groups is that in teams, the members can achieve more than they would have achieved working independently (Lank 2006, Katzenbach & Smith 2005). Team effectiveness is a result of systematic teamwork, which is based on the individual contributions of members, and thus it is essential that every team member must understand their role and responsibilities in a project and in a team (Jørgensen & Emmitt 2009).

The construction industry is mainly based on projects where the stakeholders and participants from various different organizations form project teams, and thus the teams must be understood in a broader sense than just as single work teams (Cornick & Mather 1999). In a project environment, it is crucial to understand the whole project setup and how critical it is to develop an effective team that is able to deliver the project that fulfills the customer's needs, but also to take constraints into account as well (Azmy 2012, Whelton 2004).

#### ***Integrated project teams***

Bertelsen and Koskela (2004: 5) stated that “construction is a complex production of a one-of-a-kind product undertaken mainly at the delivery point by cooperation

within a multi-skilled ad-hoc team.” Partly due to the ad-hoc teams and project environment, construction projects consist of a large quantity of waste and problems, which are mainly caused by defective stakeholder and team management, but also by a fragmented supply chain (Vrijhoef & Koskela 2000, Lahdenperä 2012).

Although construction is typically perceived as a project team industry, construction is still a largely collectivist activity (Moore & Dainty 1999). From the stakeholders’ point of view, doing well in a construction project is usually determined by the success of a single firm, rather than by the success of the whole project team (Cornick & Mather 1999). This approach results in sub-optimization in the construction industry, from which the customers ultimately suffer (Toolanen & Olofsson 2006).

One approach to fixing this bias is to integrate all of the project team members of a construction project to operate as a team, and through that improve the team members’ performance in the project, especially in complex and risky projects (Lahdenperä 2012, Brady & Davies 2011). Collaboration should not be confined to that between the contractors and customers only, but should involve the whole supply chain (Bertelsen & Koskela 2004, Vrijhoef & Koskela 2000).

In order to manage and enhance the value creation and the flow of construction projects, closer collaboration and integration among the project team members and stakeholders is needed. Team integration is usually connected to collaborative working practices, tools, and disciplines, which create an environment where communication and interaction among the team members is free and the team mutually supports each other (Ibrahim *et al.* 2011). Integration demands that the project team works together to achieve mutually attainable project purposes and objectives through communication and interaction. This means that different organizational cultures have to be aligned in a collaborative manner (Baiden *et al.* 2006, Dainty *et al.* 2001).

The term *integrated project team* (IPT) is usually referred to in describing a highly effective and efficient collaborative team because it brings together various skills and knowledge from the different project phases. Usually, integrated teams are able to remove the traditional barriers between stakeholders with responsibility for design and construction, which usually contributes to efficient project delivery positively (OGC 2003, Akintoye *et al.* 2000, Fleming & Koppelman 1996).

### *Essential characteristics of integrated teams*

Teams and stakeholders in construction projects can be integrated at various levels: delivery teams can be fully integrated, partially integrated (or fragmented), or hardly integrated at all (Baiden & Price 2011). Despite that, integration can be seen to be more successful the better the essential characteristics presented in Table 5 are realized, and the integration of a team can be evaluated by measuring the achieved level of characteristics. A characteristic can be understood as a necessary condition that is required before something else can occur. Hence, it is obvious that to create successful circumstances for highly effective team and stakeholder integration to occur, the characteristics should be considered.

First of all, an integrated team should aspire to work in a mutual location (Ross 2003, SFC 2003, Dainty *et al.* 2001, Bromley *et al.* 2003). In an ideal situation, the whole integrated project team (IPT) should operate in a mutual project office. This makes it easier to develop team spirit, but also to have seamless and face-to-face communication between all members of the IPT (Ross 2003, Moore & Dainty 2001). There should be no restrictions in information sharing and communication among the team (Evbomwan & Anumba 1998, Bromley *et al.* 2003). Information sharing and communication has been emphasized as one of the core indicators in enhancing the practice of team integration (e.g., Ibrahim *et al.* 2011, Love *et al.* 1998, Baiden *et al.* 2006). Communication is usually connected to enhanced team effectiveness, the integration of different organizational levels, more effective supervision, and job satisfaction. Jørgensen and Emmitt (2009) and Pekkanen (2005) have stated that a lack of information, communication, or a response from project stakeholders becomes critical for progressing with project decisions.

In order to be effective, an IPT should have mutual objectives and a single focus on project delivery, because overall project effectiveness and efficiency will depend on the IPT's ability to focus and work together toward common goals (Love *et al.* 1998, Winch & Bonke 2002). Therefore the team must understand the underlying factors of individual stakeholder values, needs, interests, and so on (Jørgensen & Emmitt 2009, Whelton 2004). Forming mutual goals and objectives is about how a shared view of the project's purpose can be built, the best way to achieve it, and how well the IPT will stay on target (Forques & Koskela 2009).

**Table 5. Characteristics of an integrated project team (Aapaaja *et al.* 2013b published by permission of Emerald).**

Characteristic	Purpose	Main literature sources
Team works in mutual location	Increased, unrestrained and continuous communication and interaction.	(SFC 2003, Dainty <i>et al.</i> 2001, Bromley <i>et al.</i> 2003, Ross 2003)
Organizational boundaries are ignored	Solid team spirit that contributes to the outcomes.	(Fleming & Koppelman 1996, SFC 2003, Ibrahim <i>et al.</i> 2011)
Team has mutual focus and objectives	Comprehensive optimization of the results, instead of sub-optimization. 'We win or lose together.'	(Love <i>et al.</i> 1998, Lank 2006, Lahdenperä 2012, Hoezen 2012, Laan <i>et al.</i> 2011, Whelton 2004, Ibrahim <i>et al.</i> 2011)
Each team member is allowed to present ideas concerning project delivery (fair and respectful atmosphere)	Collective responsibility for project performance and thus innovative thinking is encouraged.	(Dainty <i>et al.</i> 2001, Lahdenperä 2012, Hoezen 2012)
Each team member has an equal opportunity to contribute to the delivery process	Taking advantage of the expertise of all of the stakeholders.	(Love <i>et al.</i> 1998, Baiden <i>et al.</i> 2003, Bromley <i>et al.</i> 2003, Lahdenperä 2012, Davis & Walker 2009, Jørgensen & Emmitt 2009)
Results and innovations are mutually beneficial	Incentives ensure holistic optimization, and thus all decisions are made 'best for the project.'	(Fleming & Koppelman 1996, SFC 2003, Dainty <i>et al.</i> 2001, Ross 2003, Whelton 2004)
Focus on solving problems, not on finding out who is guilty ('no blame' culture)	Blaming doesn't benefit value creation, thus the focus must be to make sure those mistakes don't happen again.	(Dainty <i>et al.</i> 2001, Ross 2003)
Risks are shared among all actors	Everyone is in the same boat, everyone does their best.	(Ross 2003, Lahdenperä 2012)
Increased predictability of overall costs	More reliable and finished plans through collaboration.	(Baiden <i>et al.</i> 2003, Anumba <i>et al.</i> 2002, Hoezen 2012)
Increased predictability of overall schedule	Continuous review of schedule through interaction and collaboration.	(Baiden <i>et al.</i> 2003, Anumba <i>et al.</i> 2002)
No restrictions in information sharing	No need to hide anything, because the results are mutually beneficial.	(Evbuomwan & Anumba 1998, Bromley <i>et al.</i> 2003, Hoezen 2012, Ibrahim 2011, Love <i>et al.</i> 1998, Jørgensen & Emmitt 2009)
Accounting documents are exposed to every team member	The game must be open and honest if the results and risks are to be shared.	(Ross 2003, Cohen 2010)

Mutually beneficial results and outcomes are prerequisites for achieving shared project objectives and purposes – the parties win or lose together. So, if the benefits are shared, it is essential that the project risks are shared as well. This is usually supported by exposing the accounting documents related to project delivery (Ross 2003, Cohen 2010). The characteristics presented above usually result in increased predictability of the overall costs and schedules (Baiden *et al.* 2003, Anumba *et al.* 2002). By sharing the risks and benefits, team members become dependent on each other's capabilities and hence they are encouraged to share their expertise in order to achieve an optimal outcome (Laan *et al.* 2011). In addition, such conditions reduce the opportunistic behavior of members (Hoezen 2012).

This approach ensures that the team members are collectively accountable and responsible for the achievement of the results (Ross 2003, Fleming & Koppelman 1996, SFC 2003, Dainty *et al.* 2001, Cohen 2010). To unleash the full potential of the cumulative knowledge in a fully integrated team, each actor has an equal opportunity to contribute to the project's delivery (Love *et al.* 1998, Baiden *et al.* 2003, Bromley *et al.* 2003). Establishing transparent decision processes and their wider consequences (e.g., in terms of the impact on the amount of choice regarding decisions in the later project stages) is a crucial factor when pursuing an integrative approach to systematic value optimization and waste reduction (Jørgensen & Emmitt 2009). The contribution of the whole team increases the social capital, which is the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit (Davis & Walker 2009). Essentially, team members perform better when they have contributed to the project's development (Love *et al.* 1998).

The aforementioned characteristics underpin the idea that an IPT's atmosphere has to be fair and respectful, and an absolute 'no blame' culture should prevail (Ross 2003, Dainty *et al.* 2001). Because all benefits and risks are shared, there is no need to find the guilty; it is more important to make sure that the mistake does not happen again.

Moreover, it has been noticed that operational activities should be totally free from organizational boundaries (Fleming & Koppelman 1996, SFC 2003, Dainty *et al.* 2001). Organizational boundaries within the project team have contributed to the main issue of impaired project team integration (Ibrahim *et al.* 2011, Akintoye *et al.* 2000, Fleming & Koppelman 1996). Because the IPT contains multiple representatives from different organizations and stakeholders with

different working cultures, all aspects of the project must be discussed in detail within the team in order to overcome operational differences (Forques & Koskela 2009).

## **2.4 Project stakeholder approach**

The majority of current large projects are implemented in highly demanding and complex environments and executed by coalitions of multiple stakeholders that have divergent interests, objectives, and socio-cultural backgrounds (Aaltonen 2010, Cornick & Mather 1999). A project is most commonly defined as ‘a temporary endeavor undertaken to create a unique product, service or result’ (Project Management Institute 2004). The definition refers to an established goal, a defined lifecycle with a beginning and an end, action to do or create something that has not been done before, and specific time, cost, and performance requirements and constraints (Bourne 2005). The definition also implies the concepts of a single person, organizations, and financial and material resources in a ‘novel’ way (Turner 1999). Moreover, the project always interrelates with its location and environment, which may bring about special features (e.g., specific rules, norms, or stakeholders) to be considered (Cova & Salle 2005), if they were identified at the beginning.

Project networks include various participating groups, each with their own needs and requirements. The representatives of those groups are called project stakeholders. Prior stakeholder literature has presented various definitions of stakeholders ranging from broad to narrow views. Freeman (1984) has probably provided the most well-known, as well as broad, definition of a stakeholder: “any group or individual who can affect or is affected by the achievement of the organization’s objectives.” This broad view is based on the acknowledgment and empirical reality that companies can be vitally impacted by, or impact on, almost anyone (Mitchell *et al.* 1997, Aaltonen 2010). However, Freeman’s definition does not take a stand on the relationships that the stakeholders have with the organization. The definition does not take a stance either on whether the stakeholder requirements are legitimate or not (Aaltonen 2010).

Stakeholders have also been defined in broader ways, which take relationships and legitimacy into account. For example, IFC (2007: 10) has defined stakeholders as “people or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively.” Bourne (2005: 31)

has defined a project stakeholder as an “individual or group who have an interest or some aspect of rights or ownership in the project, can contribute in the form of knowledge or support, or can impact or be impacted by, the project.”

Moreover, many studies have suggested different kinds of stakeholders. Commonly, stakeholders are divided into internal and external (Freeman 1984) or primary and secondary (Clarkson 1995). Internal or primary stakeholders are formal members of the project coalition, and they control resources. External stakeholders can be considered as informal members of the project who have no direct control over a resource, but they do have the possibility to influence the project positively or negatively (Cleland 1986, Aaltonen & Kujala 2010, Cova & Salle 2005).

However, the division into two is many times too narrow and does not provide a sufficient picture of the stakeholders’ roles in a project. Therefore stakeholders can be determined, for example, according to their functional role in a project. Cova and Salle (2005) have determined stakeholders according to their functional role, such as a customer, contractor, end-user, and sponsor, residents in the vicinity, non-governmental organizations (NGO), media, lobbying organizations, and government. Tikkanen and Lindblom (1998) have further divided these stakeholders into business actors, community actors, and government actors.

The previous authoritative definitions are only examples among the numerous definitions, but provide a sufficiently accurate understanding of the nature of project stakeholders. From the strategic perspective, the more essential question is which stakeholders deserve or require management attention, and which do not (Mitchell *et al.* 1997). Thus the focus should be on stakeholder management.

#### **2.4.1 Project stakeholder management**

Project management needs to balance competing claims on resources between the project and the project stakeholders. The environment, uncertainty, and complexity make achieving this balance more difficult, and therefore the ability to navigate through this environment defines successful project management and hence also project success (Bourne 2005, Turner & Muller 2003). The traditional definitions of a project do not fully notice the relevance of the performing stakeholders and their contributions to project success. The project has its own team and organization, but it is part of the project environment as well (Bourne

2005). Stakeholder management starts from the premise that a company or project has relationships with other groups and organizations in the external environment. These groups and organizations have an impact on the company's decisions, but the decisions also impact that external environment (Freeman 1984).

Project stakeholder management is the systematic identification, analysis, and planning of actions to communicate with and influence stakeholders (Project Management Institute 2004). Generally, stakeholder management strives to facilitate the understanding of how to manage stakeholders in invariably changing and unpredictable environments and hence support the project management's decision making (Donaldson & Preston 1995). Moreover, considering the stakeholders' points of view can ultimately enhance the projects' understanding about the stakeholders and their management (Aaltonen 2010). For example, the barriers of collaboration and the adversarial nature in construction are mostly connected with the cultural problems and old habits between team members and stakeholders (e.g., designers and contractors). The adversarial nature causes disrespect, mistrust, and rivalry among the stakeholders that must be overcome towards developing and maintaining teamwork and stakeholder management throughout the entire project (Uher & Loosemore 2004).

Yang *et al.* (2009) argued that stakeholder management theories have centralized on two main streams: 1) identifying project stakeholders, including identifying the stakeholder boundary, assessing the commitment and interests of the stakeholders, and diagnosing their potential performances; and 2) analyzing different stakeholder relationships, explaining how stakeholders react to conflict, and formulating strategies based on this analysis. However, in many of the project stakeholder management processes, the streams are not differentiated (Aaltonen 2010), and to some extent, stakeholder management and analysis are understood as the same thing. The current literature (e.g., Cleland 1986, Karlson 2002, McElroy & Mills 2003) has suggested that stakeholder analysis should include at least the following things: stakeholder identification, characterization, and classification, and decisions about how to manage the stakeholder. As a result of stakeholder analysis, project management should be able to form a strategy for managing the relationships and interactions with the stakeholders (Aaltonen 2010).

#### **2.4.2 Stakeholder salience and position in projects**

Identifying stakeholders who can have an impact on the project outcomes and decisions is a crucial issue in stakeholder management (Olander & Landin 2005, Walker *et al.* 2008). The impact can be assessed through the stakeholder identification and salience framework (Mitchell *et al.* 1997) that identifies the stakeholders to whom managers should pay attention. According to Mitchell *et al.* (1997: 869), stakeholder *salience* (S) is “the degree to which managers give priority to competing stakeholder claims.” Salience consists of three attributes: power, legitimacy, and urgency. In addition, salience depends mostly on the number of attributes that a stakeholder has, and it refers to the degree to which managers give priority to competing stakeholder claims (Aaltonen *et al.* 2008). Salience usually varies during a project, and thus stakeholders may try to shape their salience attributes in order to get their voices heard (Mitchell *et al.* 1997). In particular, the external stakeholders are usually those who engage in different kinds of activities to shape their salience (Aaltonen & Kujala 2010).

Project stakeholders’ relative salience varies, and hence they are not equal. Therefore it is crucial that the project management assess the salience of the stakeholder in order to validate the different stakeholder requirements. Mitchell *et al.* (1997) have divided stakeholders into eight classes (Table 6) depending on the attributes of power (P), legitimacy (L), and urgency (U) that stakeholders possess.

**Table 6. Stakeholder classes.**

Stakeholder group	Stakeholder class	Definition	Possessing salience attributes
'Definite stakeholders'	Definite stakeholder	Are already members of an organization's dominant coalition. When their claims are urgent, managers have a clear and immediate mandate to consider and give priority to that claim.	P,L,U
'Expectant Stakeholders'	Dominant stakeholder	Influence is assured and it is clear that the expectations of any dominant stakeholders will matter.	P,L
	Dangerous stakeholders	They can be coercive and possibly violent, and hence they can be 'dangerous.'	P,U
	Dependent stakeholders	These stakeholders rest upon others for the power to carry out their will.	L,U
'Latent stakeholders'	Dormant stakeholders	Possess power to impose their will, but do not have any legitimate relationship or urgent claim and thus their power remains unused.	P
	Discretionary stakeholders	There is absolutely no pressure on managers to engage in an active relationship with such stakeholders, but they can choose to do so.	L
	Demanding stakeholders	Can be irksome, but not dangerous, bothersome but no warranting more than passing management attention.	U
'Non-stakeholders'	Non-stakeholders	Not salient. Cannot be counted as a project stakeholder.	-

*Power* (P) is the probability that one stakeholder within a social relationship would be in a position to carry out his or her own will despite resistance. That is to say, some stakeholder X can get another stakeholder Y to do something that Y would not otherwise have done (Mitchell *et al.* 1997). The bases of power are seen to be mainly in the type of resource used to exercise power (Aaltonen *et al.* 2008). Power can be divided into three different classes: coercive, utilitarian, and normative. Coercive power refers to the physical resources of force, violence, or restraint, while utilitarian power is based on material or financial resources. Normative power refers to symbolic resources, and because power can occur in many forms, the structure of the project network and the position of the stakeholders in a network must be taken into account. External stakeholders, especially, can increase their power, and hence their salience, through the network (Aaltonen & Kujala 2010).

In general, *legitimacy* (L) is an assumption that the actions of a stakeholder are proper, appropriate, or desirable within some socially constructed system of

norms, values, beliefs, and definitions (Mitchell *et al.* 1997). Typically, stakeholders (individuals, organizations, or society) whose claims project managers perceive to be legitimate are paid attention to (Aaltonen & Kujala 2010). However, it should be noted that if a stakeholder has no power to enforce the claim, it will not be salient in the eyes of the project manager even though the claim is legitimate (Mitchell *et al.* 1997). For example, a contractual relationship between the internal stakeholders increases the internal stakeholders' power, and therefore, external stakeholders that do not have a contractual relationship are usually neglected (Aaltonen & Kujala 2010).

*Urgency* (U) is “the degree to which stakeholder claims call for immediate attention” (Mitchell *et al.* 1997: 869), and it is based on two features: time sensitivity and criticality. Time sensitivity is the degree to which a managerial delay in attending to the claim or relationship is unacceptable to the stakeholder, and criticality refers to the importance of the claim to the stakeholder (Mitchell *et al.* 1997, Aaltonen *et al.* 2008). Urgency can also be understood as an interest of the stakeholder. In the construction industry, the negative consequences that are related to the objectives and implementation of the project are usually the factors that increase the urgency of the claims and requests (Olander & Landin 2005). Compared to power and legitimacy, urgency is not as concrete of an attribute. However, this does not decrease its importance. Actually, urgency determines the dynamics of stakeholder salience and the interactions between stakeholders (Mitchell *et al.* 1997).

Just identifying the stakeholders and assessing their salience is not enough (Johnson *et al.* 2008), because basically the salience framework defines the stakeholders' level of impact on a project only if they decide to act. However, the stakeholders' probability to act and express their interest in project decisions must also be assessed (Olander 2007). Olander (2007) created the impact/probability matrix, where the project stakeholders are categorized depending on their level of impact and probability of impact on the project. The matrix is used to analyze the following questions:

- How interested (probability to impact) is each stakeholder group in expressing their interest in, expectations for, or contributions to the project?
- Do they have the leverage (level of impact) to do so?

The matrix indicates the types of relationships that project management might typically establish with stakeholders depending on their level of impact and probability to act (Johnson *et al.* 2008):

- The ‘key players’ are often those with responsibilities for the project (high level of impact and high probability to act).
- The ‘keep satisfied’ stakeholders are national governments, authorities, or other similar organizations that have requirements, and many times, the power to stop the project. However, they do not usually have a personal interest in the project and thus the power may remain hidden (high level of impact and low probability to act).
- The ‘keep informed’ stakeholders include different interest groups, for example, local community members, NGOs, or organizations with low impact (low level of impact and high probability to act).
- ‘Minimal effort’ does not mean ignoring the stakeholders, however, the project management does not regard them as salient and focal. However, these stakeholders can try to gain salience through other stakeholders if they have some requirements of the project (low level of impact and low probability to act).

### **2.4.3 Stakeholders in the national building code of Finland**

The Finnish construction industry has traditionally followed the codes, norms, and regulations that are generally, in this research, referred to as the national building code of Finland (NBCF). The versatile and comprehensive NBCF is a typical source for all of the parties in a building and renovation project and it is a source of information for the building industry that includes contracts, building, design, construction, repair, maintenance, and building products.

According to the NBCF (e.g., Building Information Ltd. 1989), construction projects aim to provide space for specific needs and requirements, and the project must contain all the necessary actions that fulfill those needs and requirements. Also, the projects start when the decision about the construction is made and end when the building starts its operation.

Traditionally, construction project tasks are distributed among different stakeholders and the distribution rests upon the complexity of the project; the more complex the project is, the greater is the number of stakeholders. In small

projects, for example, one actor can represent many stakeholders, but in large projects, stakeholders may vary during the project.

The NBCF (e.g., Building Information Ltd. 1989) identifies five stakeholders: end-user, developer, designer, contractor, and public authority. Depending on the project, the developer can be a buyer and an end-user, but these can also be separate stakeholders. However, a buyer is not specified.

Basically, the end-user, or at least the generic end-use, of the building is always known, and therefore the end-user representative typically acts as an expert of the operation; his or her qualitative needs, wants, and requirements are the starting points for the project. The role of the other stakeholders is to attend to how those needs and wants are mapped, translated into requirements, and finally fulfilled. In this context, an end-user includes residents, but also maintenance (Building Information Ltd. 1989).

A developer executes the project. The developer's main mission is to make sure that he or she is getting buildings that fulfill his or her needs and objectives. Hence, the developer typically works closely with the end-users. Consultants' expertise can also be used to solve difficult issues (Building Information Ltd. 1989).

A designer is responsible for the engineering and designers. A construction project usually contains a group of designers from different fields of expertise. The number of stakeholders is dependent on the project's size, and that is why the design group can vary as well: in a simple project, one designer can be responsible for all the designs, but, in a traditional project, the group most often contains a main designer, architect, technical designer, and structural designer (Building Information Ltd. 1989).

A builder – usually a main contractor – takes care of the construction process. Depending on the project and resources, using subcontractors is also possible. Generally, most of the current projects are so big and complex that the main contractor almost always hires subcontractors to perform some part of the whole (Building Information Ltd. 1989).

Because construction is subject to licensing, public authorities monitor a project's compliance with laws, norms, and codes, especially the local ones. Thus, the local supervisor of the building has the main responsibility. Other authorities involved are the local health, fire, and safety departments, and financial institutions and planning (Building Information Ltd. 1989).

## 2.5 Early involvement in requirements engineering

Construction was formerly considered as an industry that principally dealt with construction firms and project teams. However, the new aspects are culminating on the fact that the construction industry can no longer provide just a single product, but must also provide a variety of services to the built environment around the project (Carassus *et al.* 2006, Brady *et al.* 2005, Pekkanen 2005). The extension of this aspect has increased the uncertainty and complexity of project management, and hence has highlighted the importance of systematic collecting, managing, and reconciling the different stakeholder requirements. Pekkanen (2005) has emphasized that project purposes must always be based on and fulfill the actual and ultimate needs of the customer and end-user.

Requirements define what needs to be done, and therefore those must be identified during the early phase of the project as a specification of what should be built (Baiden *et al.* 2006). Requirements have been defined in various ways. A requirement is “anything that drives design choices” (Lawrence 1997), “something required, something wanted or needed” (Webster’s Ninth New Collegiate Dictionary 1989), or “a statement of a system service or constraint” (Kotonya & Sommerville 1998). Based on these definitions, requirements are the carriers of customer and stakeholder needs. Requirements act as a map that guides workers to achieve the desirable outcome. Without a good map, it is difficult to reach the destination successfully. Misunderstood and misinterpreted requirements are the most expensive errors to fix (Distanont 2013, Grady 1999), and hence time and money may be wasted as well.

*Requirements engineering* (RE) is a systematic and iterative process to understand, capture, and document what stakeholders require from a project (e.g., Kotonya & Sommerville 1998, Asghar & Umar 2010). The background of requirements engineering (RE) lies in the information and communication technology industry (Beichter *et al.* 1984), where it has been used for years. An effectively performed RE process plays a major role in a project’s success, and hence the purpose of RE is to create understandable, complete, and consistent requirements that all the stakeholders can accept (Asghar & Umar 2010).

Requirements engineering is part of the front-end activities and main stages for developing any new product, and therefore RE ensures that all the needs are treated in the same way (Wiegiers 2003). RE is a collaborative and systematic process for developing requirements through communicating requests/requirements, transferring the information, analyzing the information,

negotiating the problem, documenting the results, and checking the accuracy of the understanding gained from the identified stakeholders.

The stakeholders and requirements that the project management perceives to have high salience are usually noticed and listened to more carefully than those who are not considered to be salient (Lehtola *et al.* 2004). Despite that, one of the key points of the requirements engineering process is to ensure that stakeholder needs will be turned into satisfied requirements. Commonly, only a limited set of requirements can be implemented, however, the project should meet the needs of the customers and other stakeholders. Thus, many organizations believe that it is not only vital to enable their stakeholders to assign priorities to requirements and to make decisions about them, but also to provide them with alternative options customized for their different needs (Boehm & Huang 2003). This emphasizes the collaborative and social nature of the RE process, which should involve all the project stakeholders (Distanont 2013).

### **2.5.1 Early stakeholder involvement**

There are few examples of applying early stakeholder involvement to construction projects, whereas in the manufacturing industry, the different aspects of the stakeholders of early product development have been addressed by utilizing the Design for X (DfX) methodology. DfX is a structured approach to systematically addressing early product development and functional integration, and enabling capability creation. In DfX, the X stands for an aspect or a stakeholder under consideration, such as manufacturing, environment, maintenance, supply chain, cost, and so on (Bralla 1996, Möttönen *et al.* 2009, Lehto *et al.* 2011). Basically, the same Xs exist in the construction industry as well, but the names can be different, typically different companies. Therefore, the DfX analogy remains the same, and it is essential to take stakeholders and their opinions into account in the construction industry, just like in product development in the high-technology industry.

In the construction industry, technological change and increasingly more complex projects have encouraged or even forced firms to involve suppliers, subcontractors, and stakeholders in the early phases of projects (Ragatz *et al.* 1997, Mikkola & Skjoett-Larsen 2003, Handfield *et al.* 1999, van Valkenburg *et al.* 2008). Trent and Monczka (1999) have stated that “early involvement seeks to maximize the benefit received from a supplier’s engineering, design, testing, manufacturing and tooling capabilities.”

Ragatz *et al.* (2002) have stated that involvement may range from simple consultation on design ideas to making stakeholders fully responsible for the design of components, systems, processes, or services they will supply. As a rule of thumb, it can be said that the more complex the developed product or project is, the earlier the supplier or stakeholder should be involved. However, early involvement is also vital when the delivered product is a subsystem rather than a single component, and when a stakeholder holds critical items of technology with regards to the project (Handfield *et al.* 1999). Moreover, the roles and responsibilities of the stakeholders can have an impact on the level and time of involvement, and hence stakeholders with very little responsibility for the project can be involved at later stages of the project (Monczka *et al.* 2000).

### *The value of early stakeholder involvement*

The reason why stakeholders should be involved lies in the benefits that can be achieved through collaboration, but also the requirements and knowledge gained from the stakeholders. Successful involvement can result in cost reductions, improved quality, reduced product development time, better access to needed technologies, and increased value throughout the whole value chain (Ragatz *et al.* 1997, Mikkola & Skjoett-Larsen 2003, Handfield *et al.* 1999, van Valkenburg *et al.* 2008). According to several studies (Dowlatshahi 1998, van Valkenburg *et al.* 2008, Wagner & Hoegl 2006, Jørgensen & Emmitt 2009), early stakeholder involvement has yielded at least the following benefits:

- Early involvement leads to a lower likelihood of developing poor designs.
- Early involvement in the design stage leads to a higher likelihood of a more effective design, improved construction operations, and less scrap.
- Early knowledge about the end-users leads to higher customer satisfaction regarding the product's function and usage.
- Suppliers' specialized knowledge and competencies can be exploited and considered more efficiently.
- The more the stakeholders know about the customers' or end-users' actual usage of the products, the more efficient the stakeholders' operations are in terms of meeting the buyer's needs and purposes.
- The more the stakeholders know about the exact objectives of the design specifications, the more the stakeholders are able to meet or revise those specifications by adjusting their capabilities.

- Early involvement allows room for creative solutions and the intensive exchange of ideas.
- Early involvement leads to procedures that are synchronized and run in phases.
- The possibility to contribute in early project phases to the project outcomes and solutions motivates the stakeholders and increases their commitment to the project's implementation.

In the context of construction, the design changes made through stakeholder involvement in the early project phases cost only a fraction of what they cost in later phases. The possibilities of influencing project success are seen to be best during the early project stages, because decisions made early reduce unnecessary changes during later development stages, and even reduce the total lifecycle costs (Möttönen *et al.* 2009, Lehto *et al.* 201, Jørgensen & Emmitt 2009, Pekkanen 2005).

The role of active and early stakeholder involvement has been found to be essential in the practical efforts of applying a Lean perspective to the construction industry (Jørgensen & Emmitt 2009, Cohen 2010). Particularly important from Lean is that late changes can very easily result in huge waste. Partly due to the good experiences of early stakeholder involvement and bad experiences with traditional delivery methods, the many players in the construction industry have started to apply methods that strive towards stakeholder involvement and team integration in the early project phases.

### **2.5.2 Requirements engineering process**

Most of the RE literature (e.g., Distanont 2013, Wiegers 2003, Kotonya & Sommerville 1998) divides RE into two separate processes: requirements development and requirements management. Basically, the requirements development process focuses on the gathering of the customers' ideas, which are then analyzed and transformed into detailed customer specifications. Requirements development can be further divided into four interwoven sub-phases: elicitation, analysis, documentation, and validation (Wiegers 2003, Kotonya & Sommerville 1998).

Elicitation is the process of gathering requirements from various sources and stakeholders. Communication and interaction are crucial, but also, people who have technical, communication, and people skills are required (Faulk 1997).

Analysis aims at reviewing the requirement's priority and feasibility, resolving conflicts, and negotiating alternatives among the different stakeholders. The point of documentation is to save and concretize the requirement. The documentation should be conducted in a standard way, otherwise the information about the requirements may change during the development process. The purpose of validation is to ensure that the requirements are accurate and complete and define the right system that the user expects (Distanont 2013).

Requirements management focuses on managing changes in the requirements and is concerned with organizing, tracking, and maintaining the requirements throughout the development process (Distanont 2013). Generally, the main idea of the whole requirements engineering process is to purify and choose the correct requirements for implementation. Hence, the two processes of requirements engineering can be seen more as a parallel and continuous loop than staged and fixed processes.

### ***2.5.3 Requirements in organizational interfaces***

Although managing the requirements may include technical tools and systems, the RE process itself is a communication activity (Wiegiers 2003) that involves and requires frequent communication and interaction between the stakeholders. However, the stakeholders have different backgrounds, skills, objectives, and views (Coughlan & Macredie 2002), and they may represent entirely different organizations or expertise. During the RE process, stakeholders need to collaborate and transfer knowledge to express their needs, wants, and information to create complete and accurate requirements (Distanont 2013).

Communication and interaction are not easy practices, because the RE process not only involves various stakeholders, but also, the wants, requirements, or knowledge to be communicated and transferred are difficult to express explicitly to others (Pilat & Kaindl 2011, Distanont 2013). In the RE process, anyone who expresses needs, wants, and requirements is a stakeholder, but the final requirements are based mainly on customer needs. Although the customers usually know what they want, they do not necessarily know how it should be designed or developed. Additionally, usually the designers do not know the tools and techniques required to build and maintain the end product. Generally, communication can be considered a main problem of the RE process, because there is a lot of information and requirements to be transferred and shared among stakeholders (Distanont 2013). Even communication on requirements inside the

organization can be difficult – the challenges will still accumulate when the requirement occurs over the organizational interfaces (Kropsu-Vehkaperä *et al.* 2011, Pekkanen 2005, Kiviniemi 2005); especially, when the stakeholders are not in the same place, and when they have, for example, different languages, cultures, terms, and fields of expertise (Distanont 2013). However, managing the requirements in organizational interfaces is crucial because organizational interfaces provide significant sources of innovations (Yliherva 2004).

#### **2.5.4 Requirements in construction**

Distanont (2013) has stated that requirements describe what the end product must do and hence they provide a reliable way for the stakeholders to agree, but they also emerge from the conversations among all the project stakeholders. Requirements should not only be understood as features of an end product set by the customer, but they can also be constraints set by the other stakeholders or the project environment. For example, the customer and other stakeholders may have constraints that are connected to the schedule, finance, resources or solutions.

Requirements are always dependent on the context of the project in which it is implemented. Kamara *et al.* (2000) have identified different types of requirements that customers and other stakeholders may present in a construction project:

- *Customer requirements:* Customer requirements describe the facility that satisfies his or her business needs. Incorporates user requirements and those of other interest groups.
- *Site requirements:* These refer to the characteristics of the site on which the facility is going to be built (e.g., ground conditions, existing services).
- *Environmental requirements:* These describe the environment (e.g., climatic or ground factors) surrounding the proposed site for the facility.
- *Regulatory requirements:* Building, planning, health, and safety regulations and other legal requirements that impact the acquisition, existence, operation, and disposal of the facility.
- *Design requirements:* These are the requirements for design, which are a translation of the customer needs and the site and environmental requirements. They are expressed in a format that the designers can understand and act upon.
- *Construction requirements:* These are the requirements for actual construction that follow from the design activities.

- *Lifecycle requirements*: These go beyond project completion, and include the requirements for operating, maintaining, and disposing of or recycling the facility. Basically, lifecycle requirements are not project requirements but, as a construction project is not an end in itself, it is necessary that they be considered during the project, preferably within the customer requirements.

## 2.6 Theoretical synthesis

The theoretical study provides a foundation for studying the way value can be maximized through early stakeholder involvement and integration, but also emphasizes the relations and interactions among the key concepts in this research (Figure 6). The concepts of integrated project teams, requirements engineering, and project stakeholder management form a complete entity that enables early stakeholder involvement and integration. Hence the ideas and philosophy of Lean are put into practice by maximizing the value and minimizing the waste.

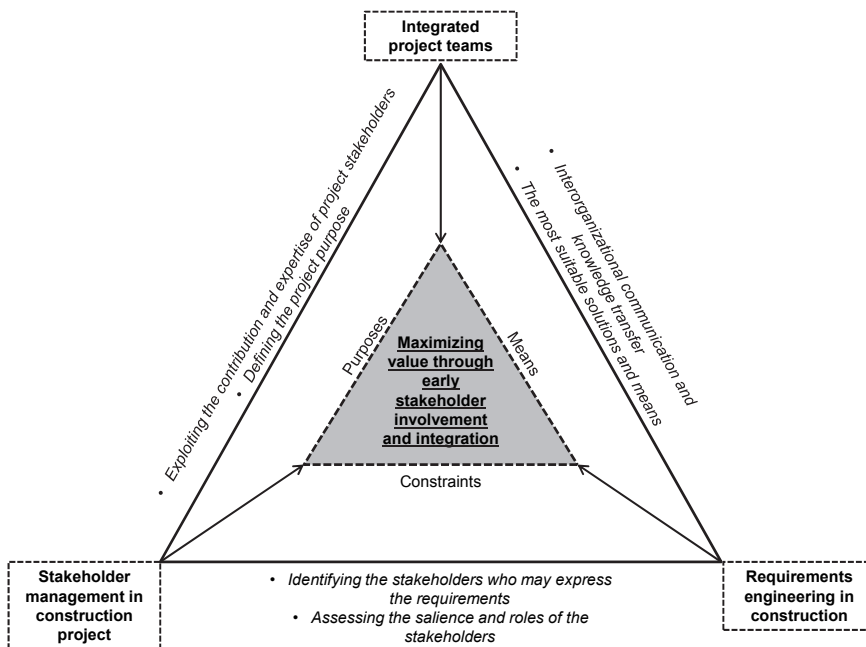


Fig. 6. The linkage of the key concepts of this research.

The literature review shows that the foundation for effective value creation is created in the early phases of the project. The benefits of early involvement stand out especially when the stakeholders work as an integrated team, because the synergic benefits can be achieved by exploiting the expertise of the stakeholders and the interfaces between the organizations are significant sources of innovations if the interaction is managed wisely. Additionally, the early decisions and involvement reduce unnecessary changes during the later development phases and even the total costs of the lifecycle. However, taking full advantage of stakeholders' expertise and knowledge demands that the project management systematically identify and involve the projects' key stakeholders immediately at the beginning of the project.

*A systematic stakeholder management process covers stakeholder identification, classification, and management.* Usually, this process must be controlled by a project management team or project core group/team that has a comprehensive understanding of the project, as well as the power to steer and manage the project. Based on the roles and responsibilities, all project stakeholders are not equal to each other, and thus cannot be handled similarly. *One way to analyze the project stakeholders is to assess the salience of the identified stakeholders relative to the project's purposes, requirements, and constraints.* In addition to evaluating stakeholder salience, it is essential to *discuss the stakeholders' roles and responsibilities within the project and what kind of requirements they can express and bring forward.*

In the construction industry, stakeholder management has been proven to be challenging. For example, in the Finnish construction industry, traditional approaches to project delivery have followed the national building code of Finland (NBCF) strictly, where the stakeholders are presented as a fixed group of five (end-user, developer, engineer, contractor, and public authority) and their roles are assigned in detail. The problem with this limited view of stakeholders in the NBCF is that complex projects and environments involve numerous stakeholders of different types. Therefore, it cannot be assumed that all projects include only five different stakeholders that always play the same role. Furthermore, *stakeholder involvement is generally project-specific, and the involvement only concerns internal and external stakeholders that may have both requirements and contributions to the project.*

*Project stakeholders, and their responsibilities and salience, usually vary during the project.* Additionally, in complex projects, the number and type of stakeholders will grow to uncontrollable numbers, not to mention the needs and

requirements sometimes conflicting. Therefore, effective requirements engineering requires that the *stakeholders' needs are systematically documented, because this is the only way to make sure that the requirements are indisputable and can also be discussed, analyzed, and referred.* Moreover, documentation leads to the traceability of the design decisions to the original requirements throughout the lifecycle of the facility.

In sum, this research has led to the understanding that *the benefits and value of early stakeholder involvement and integration crystallize to the fact that the stakeholders must work together in collaboration to define the constraints and means that fulfill the customer's purposes as well as possible* (inner triangle in Figure 6). If the previous expression is discussed in more detail, it can be seen that it is the sum of many things and theories. First of all, there must be an integrated project team that includes the most capable participants in order to maximize value creation. However, the team cannot be formed if the stakeholders are not identified, analyzed, and managed systematically and project specifically. Finally, the requirements of the project stakeholders must be elicited, analyzed, documented, and validated. Additionally, this should be done as early as possible to exploit the benefits of the requirements engineering. Table 7 summarizes the most essential theories and concepts behind stakeholder management, involvement, and integration in construction.

**Table 7. Main theories and concepts of this research.**

Topic	Key concepts for the creation of the stakeholder identification and classification framework	Main references
Lean	Definition of Lean philosophy and Lean construction	(Liker & Lamb 2001, Womack & Jones 2003, Jørgensen & Emmitt 2009)
	Maximizing customer value and value creation	(Walter <i>et al.</i> 2001, Ahola <i>et al.</i> 2008, Bertelsen & Koskela 2002, LCI 2013)
Relational project delivery arrangements	The nature of and need for RPDA	(Lahdenperä 2012, Moore & Dainty 2001, DTF 2006, AIA 2007, Ross 2003, Lichtig 2006)
	Project definition process	(DTF 2006, Ross 2003, Ashcraft 2010, Thomsen <i>et al.</i> 2009)
	Integrated project teams	(Bertelsen & Koskela 2004, Dainty <i>et al.</i> 2001, Baiden <i>et al.</i> 2003, Love <i>et al.</i> 1998, Ross 2003)
Stakeholder approach	Stakeholder concept	(Aaltonen 2010, Freeman 1984, Cleland 1986)
	Stakeholder management	(Aaltonen 2010, Bourne 2005, Cova & Salle 2005)
	Stakeholder salience	(Mitchell <i>et al.</i> 1997, Aaltonen <i>et al.</i> 2008, Aaltonen & Kujala 2010)
Early involvement in requirements engineering	Early stakeholder involvement	(Ragatz <i>et al.</i> 1997, Mikkola & Skjoett-Larsen 2003, Handfield <i>et al.</i> 1999)
	Requirements engineering process	(Distanont 2013, Kotonya & Sommerville 1998)
	Requirements in organizational interfaces	(Distanont 2013)
	Requirement types in construction	(Kamara <i>et al.</i> 2000)

### 3 Research contribution

This chapter presents the research contributions of the original publications. The research questions are presented in the introduction (Table 1) and the results are synthesized in chapter 3.5. Figure 7 represents the results of this research related to the research questions and theory.

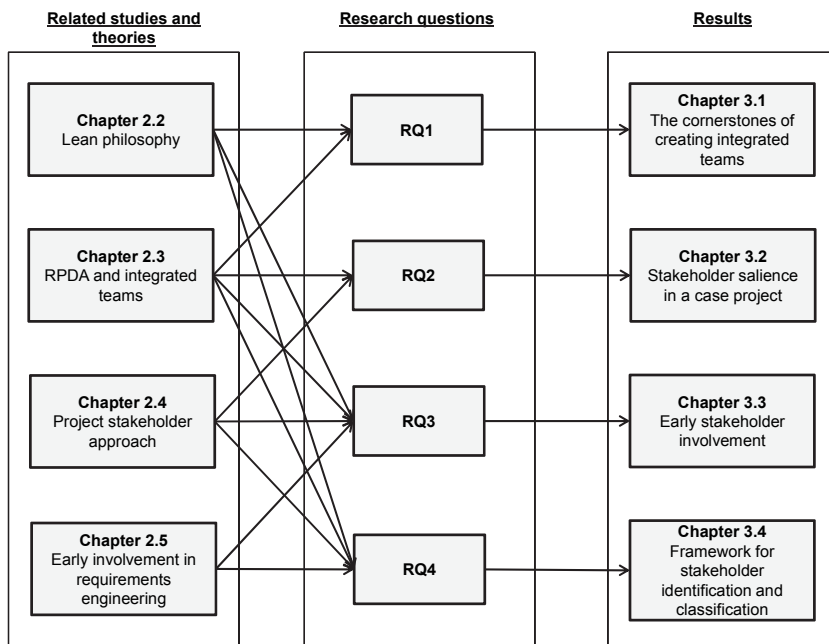


Fig. 7. Relationships of the research questions to the theory and results of the research.

#### 3.1 The cornerstones for creating an integrated team

The focus of construction projects has shifted from input to outcome which reveals that contractors often complain about suppliers who only think about the needs of their immediate customer on the supply chain and are ignorant about the end customers' needs. Generally, the whole industry is too remote from customer value. A central principle is that better team and stakeholder integration will solve many of the problems that traditional habits and contracts have caused within the industry. Hence, the development of existing project delivery methods towards RPDA and related methods is central to the possibilities of achieving a more

effective construction process. However, the nature and habits of the construction industry have shown that there is no easy way to develop an integrated project team.

In this paper, we recognized four cornerstones for creating integrated teams. The purpose of the cornerstones is to create a frame through which the characteristics of an integrated team (Table 5) can be achieved better, and thus, value creation is maximized, right from the beginning to the end of the project. The recognized interwoven cornerstones are as follows:

- early involvement and assessment of stakeholders,
- continuous communication and interaction,
- creating an RPDA culture, and
- making the RPDA process better known.

In Table 8, the most important features of each cornerstone are listed, in order to clarify their meaning and purpose. The main purpose of the early involvement and assessment of the stakeholders is to create a ‘knowledge pool’ that can be used to maximize value creation. Successful collaboration is one of the most efficient ways to gain good outcomes for all project stakeholders, especially when it brings together complementary stakeholders with different ideas and contributions.

**Table 8. The cornerstones for creating an integrated team.**

Cornerstone	The objectives and features of the cornerstone
Early involvement and assessment	Exploiting the contribution and expertise of team members Maximizing the value creation of the whole project Team as ‘a knowledge pool’
Communication and interaction	Building trust between team members Continuous and unrestrained coordination of the projects Information sharing
Cultural change	‘Best for the project’ decisions Commitment to mutual objectives ‘We win or lose together’ mentality
Making RPDA process well known	Contractual terms Incentives Collective responsibility for the project Transparency and willingness to provide assistance when needed

In RPDA, like in the case of other highly collaborative processes, the integration of the various stakeholders must be built upon mutual trust and communication. Increased interaction and communication is crucial in project coordination as well. However, building trust takes time, but the team members can support the trustworthiness by showing their abilities, benevolence, and integrity. Early involvement and systematic communication together enable a project to seek the most capable stakeholders and negotiate the project's purposes. Without proper and early understanding about stakeholder needs and requirements, the generated and chosen project solutions are not likely to create as much value as possible.

To get rid of old habits, cultural change plays a central role. All of the project decisions should be made in terms of what is 'best for the project,' and therefore the stakeholders must be committed towards mutual objectives. Creating a harmonious, integrated project team and an RPDA culture demands a strong commitment and perseverance from every stakeholder. The project team must facilitate sharing the perspectives of all stakeholders – including those who have conflicting needs and interests. However, cultural change cannot be reached if the nature of RPDA is not well known among the project team and the stakeholders. Hence, this implies that these two cornerstones, like the two other cornerstones as well, are interwoven.

There are huge differences between RPDAs and traditional delivery methods. Therefore, the contractual terms, collective responsibilities, and transparency of the whole project procurement and delivery must be emphasized. The incentives are an essential part of RPDA, because usually people or firms are not willing to change their processes or ways of working unless there is something to reach for that improves their business. Incentives can be considered as the sum of the monetary and non-monetary advantages that promote collaboration and mutually beneficial results. Even though RPDA aims to reduce the significance of price solely, the integrated team still measures their success through the financial indicators. Thus the money is still a motivating factor for collaboration, and must not be underestimated either.

Of these four cornerstones, early stakeholder involvement and assessment can be emphasized as the most crucial, because it is the best way to create a strong basis of integration. In a project where the stakeholders are involved in advance, the individuals may contribute significantly to meeting the cost and schedule objectives by reviewing the reasonableness of the duration and effort estimates. Having a team that is tuned in to the needs of the customer is a cornerstone for a successful, integrated project.

### 3.2 Stakeholder salience in a construction project

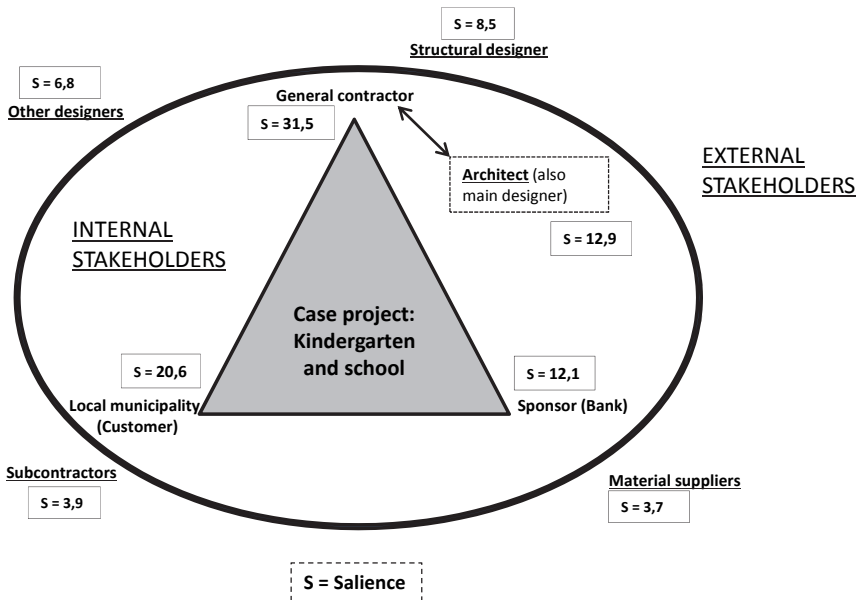
Generally, construction projects include various tasks that are distributed among different stakeholders. Usually the distribution is dependent on the complexity of the project: the more complex the project is, the bigger is the number of stakeholders. However, in Finland, the project delivery methods of construction obey the norms and the national building code of Finland (NBCF) (e.g., Building Information Ltd. 1989), where the roles of the stakeholders are assigned in detail. Moreover, the NBCF presents project stakeholders as a fixed group of five (end-user, developer, engineer, contractor, and public authority) and it does not take a stance on the salience of the stakeholders.

In the paper, the salience of the project stakeholders was assessed and the gap between the NBCF and the current practices of effective stakeholder management was addressed. The NBCF's division of stakeholders can be sufficient for traditional and simple construction projects, but in complex projects, those five stakeholders that NBCF identifies represent just a small part of the stakeholders that the project touches. For example, the local residents and community members are not regarded as stakeholders in the NBCF, even though they caused a six-month delay for the case project. Additionally, several previous studies (Olander 2007, Achterkamp & Vos 2008) have emphasized the significance of third parties, like local residents and the media. Such parties can lack power, but can perceive themselves to be highly legitimate and by that try to gain salience through more powerful and salient stakeholders.

In some ways, the NBCF seems to aim at the optimization of the planning and construction process, and not the whole project itself, which actually starts long before the planning process. A sponsor (e.g., bank) is not mentioned at all, but in our case they were a highly salient stakeholder. Although the bank did not use their authority, our study shows the great importance of money in the current construction industry. In addition, nowadays it is typical that the end-user and the customer (or owner) are different stakeholders, in our case, the bank was the owner who leased the premises to the local municipality.

In our study, we assessed the stakeholders' salience in a case project. Figure 8 shows that there are huge differences in stakeholders' *salience* (S), especially between the internal and external stakeholders. A lack of understanding of the stakeholders, their salience, and their potential to influence during the project lifecycle is a major challenge. Nowadays, creating successful projects usually requires interaction with all the project stakeholders. However, that does not mean

that stakeholders should be equal (they never are), but to maximize the project value, they should have a right to bring their thoughts and expertise forward. In addition, through interaction, the project and project management can understand and consider both the purposes of the stakeholders and the means through which their interests can impact the project.



**Fig. 8. Stakeholders' salience in a case project (Aapaoja *et al.* in press, published by permission of International Journal of Performance Measurement).**

The results of the study imply that salience varies between the stakeholders, and in order to enhance stakeholder management in the construction industry, projects must pay more attention to stakeholder assessment and involvement across the whole project lifecycle. Thus, there should be a systematic process or framework that expands and enhances stakeholder management through identification, assessment, and involvement in construction projects. Use of such a framework could enhance both value creation and the performance of the construction projects, and opportunities, as well as problems, can be anticipated better. A systematic process would help in the formation and involvement of the project team and stakeholders, and ultimately in the conditions for successful stakeholder integration and project delivery. By joining stakeholders in the same integrated

process, the project content and customer requirements are perceived better and the focus can be put on those.

Furthermore, the NBCF alone is not sufficient for the effective planning and execution of current construction projects, and therefore more effort should be put into the assessment, identification, and involvement of the project stakeholders, so that their roles can be defined more effectively. In particular, the stakeholder identification, analysis, and involvement should start right from the inception of the projects, because several other studies (Shen *et al.* 2004, IFC 2007) have emphasized that most of the value is created in the design phase.

### **3.3 Early stakeholder involvement in the project definition phase**

Traditionally, construction projects start from the premise that the customers know what they want and what they need. Value creation is, however, more than implementing an extensive set of features. Customers do not seek products or services in themselves, they want solutions that support their processes and create value when used. Therefore, during the project definition phase, the task of project management today is to challenge the customer's self-understanding about the project's objectives, reveal conflicts between the customer and the other stakeholders, and confront the customer's desires by exploring alternatives that were not previously considered. Consequently, new approaches help to expose the customer to alternative means of accomplishing their purposes beyond those they have previously considered, and to help the customers understand the consequences of their desires. Moreover, early stakeholder involvement enables projects to utilize the knowledge base of the stakeholders.

The problems in construction are confronted especially during the project definition phase, which defines the project's purposes to meet the stakeholders' and project's needs. The project definition answers the question 'what,' and it determines the project's purposes, which are ultimately translated into criteria for assessing alternative designs or solutions and generated into alternative design concepts (Whelton 2004). The main objective of this study is to examine which key stakeholders should be involved in the project definition phase, in order to maximize value creation by identifying the different roles, liabilities, and objectives of the project stakeholders, especially the major ones.

### **3.3.1 Early involvement in the case project**

The case project is a renovation project located in the city center of Joensuu in southeast Finland. The subject of the case study is a private housing company that contains two interconnected four-story buildings (19,600 cubic meters) built in 1971. One building serves as business offices (39 offices) and the other one as an apartment building (19 apartments).

Huge problems exist in defining and completing renovation projects. The common problems are: 1) the customer's organization has a vague and defective decision-making process, 2) customers are rarely experts in construction and building, 3) the inadequate collection of source information and customer needs, 4) undefined roles and responsibilities of the stakeholders, 5) differences in needs, wants, requirements, and opinions of the project stakeholders, and 6) comprehensive renovation concepts, practices, and business models that promote collaboration.

Most of the challenges and problems stem from using the wrong delivery methods; renovation does not have established practices, and hence these projects are difficult to manage effectively. However, many of the problems occur because the roles of the customer and end-users are not properly understood. The customer organizations (mainly housing companies) typically consist of the residents of the building, and thus they are rarely experts in construction. Due to that fact, they do not necessarily know their ultimate needs, not to mention their requirements. Moreover, the customer's defective and fuzzy decision-making process causes the project to lack a clear direction, and hence the purposes and objectives are not concretized at all. Therefore, it is almost impossible for the other project stakeholders to know what is needed, who is responsible for what, who takes care of what, and who has the competency to perform tasks. The aforementioned problems create a treadmill where the project's purposes and objectives are often defined without the customer having a voice.

In the case project, seven stakeholders who had an impact on the project or were impacted by the project were identified by applying the snowball sampling method. Table 9 shows why each stakeholder should be involved early in the project definition phase in order to avoid problems. The descriptions are quotes from the interviews.

**Table 9. Why different stakeholders should be involved early (Aapaoja et al. 2013a).**

Stakeholders	The reason to involve early?
Customer	Renovation projects are mainly started by the customer. The project fulfills and puts the customer's needs in practice, and therefore the needs should be mapped right in the beginning.
Construction consultant	Typically, housing companies are not experts in construction, and therefore a consultant can help with his expertise.
Property manager	A property manager usually has the best knowledge and information about the property and what we are trying to achieve. Provides source information for designing.
Planning division	Frames and constraints set for the project are binding, which must be obeyed if the project is carried out.
Architect (main designer)	The main designer is in charge of the completion of the designs and the project. The main designer must find the most economical solutions, which are prefaced in the early phases of the project.
Main contractor	The good and bad experiences (e.g., solutions, constructability) gained from the previous project are the most useful things to be exploited.
Other designers (incl. structural)	If it is presumed that some specific competence is required, then early involvement should be considered (e.g., the structural designer is a key stakeholder if there is no precise information about the foundations).

### **3.3.2 Implications for stakeholder involvement**

There are no comprehensive practices for completing and maximizing value in complex renovation projects. Customers are seeking the freedom of choice to interact with firms and define choices in a manner that reflects their view of value. Hence, the construction industry can no longer afford to view customers and other stakeholders as the passive recipients of products, services, and deliveries. There should be more emphasis on value-adding activities within the value streams and consideration of the whole lifecycle of the end product, therefore, the construction industry would benefit from stakeholder-led processes. Basically, this means that the mindset shifts from a traditional subsystem delivery to system co-creation.

If it is desired that the mindset and practices change towards value cooperation, early stakeholder involvement and integration play a central role. Early involvement aims to maximize the benefits and contributions received from management, engineering, design, and building capabilities. Furthermore, the stakeholders who work directly in integrated teams can provide insights into the building process required by the design requirements. The stakeholders can also

help to identify solutions that provide the most efficient and effective fit to the end product.

The findings emphasize that one starting point for stakeholder involvement is to evaluate and understand the stakeholders from the perspective of the customer, and to determine their relevance to the project. In carrying out this analysis, questions are asked about the positions, interests, influence, interrelations, networks, and other characteristics of the stakeholders, with reference to their past and present positions and also their future potential.

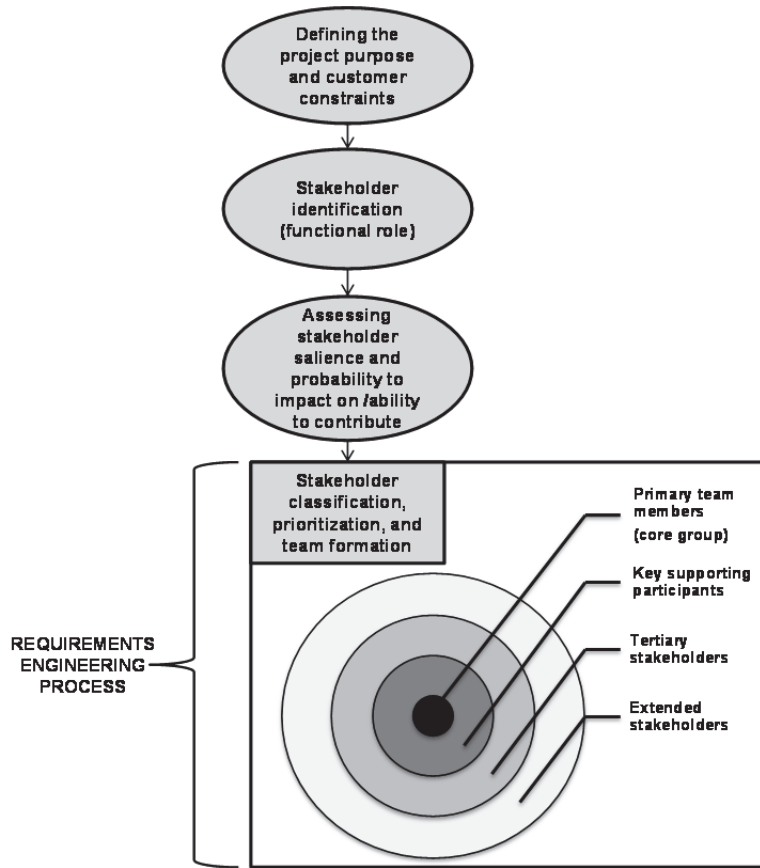
Stakeholder involvement and integration are not easy tasks, and therefore some studies (e.g., Sobrero & Roberts 2002, Aapaoja *et al.* 2013b) have been carried out in order to find out what the critical success factors are. The findings of this case study confirm those factors from previous studies which suggest that communication and interaction between the involved stakeholders is vital, because an increased understanding about the other project stakeholders is more likely to result in enhanced interaction, information sharing, and involvement among the stakeholders. Other success factors include assuring that the stakeholders contribute as they expected to, creating the perception of equal benefits among the stakeholders, and building trust and commitment between the stakeholders.

### **3.4 Framework for stakeholder identification and classification**

The last paper in this dissertation presents a framework to facilitate stakeholder identification, classification, and requirements engineering, particularly at the beginning of a project. The framework strives to enable the creation of integrated project teams by identifying and involving stakeholders that may significantly impact or contribute to the project. Hence, the ultimate objective of the framework is to optimize the value creation of the project.

The framework merges the theories of project stakeholder management, salience, and classification, but also requirements engineering. The framework contains four main phases (Figure 9):

- Defining the project's purpose and customer constraints.
- Identifying project stakeholders and their functional role in it.
- The assessment of stakeholder salience and the probability of their impact on/ability to contribute to the project.
- Stakeholder classification and prioritization into four groups.



**Fig. 9. The framework for stakeholder identification and classification (Aapaoja & Haapasalo 2014).**

Requirements engineering process is included in the framework. Although stakeholder requirements are gathered, systematic requirements engineering does not start until the last phase, in which the stakeholders are classified. Only then can the requirements be systematically engineered and managed.

The framework focuses especially on the initiation and definition of the project, which is vital to identify both certain and uncertain (participation inconclusive) project stakeholders. Stakeholders' roles, responsibilities, and salience may vary and change during a project. To analyze changes among the stakeholders and their salience, the same framework can be applied again in different phases of the project.

Furthermore, the framework does not consider stakeholders' attitudes (e.g., proponent or opponent). However, stakeholder requirements must always be taken into account, whether they support or oppose the project. Moreover, in the eyes of project management, the proponents are usually perceived to have higher salience and probability of impact and contribution than the opponents have.

### ***3.4.1 Defining the project's purpose and customer constraints***

In the early project phases (initiation and definition), the main task is to define the project's purpose and what the business and the customers want to achieve (Razali & Anwar 2011). Additionally, to complete the project in a reasonable and suitable way, the customers' constraints must also be considered. The constraints include not only the project's budget and schedule, but also factors, like the resources and competence of the customers, which can have an influence on project completion. Basically, customer constraints define the degree of freedom within the project in relation to its purposes.

The project purpose and customer constraints are two of the most essential aspects, and hence they must be carefully documented. As previously accentuated, systematic and standardized documentation is the only way to ensure the traceability of requirements and enable them to be discussed, analyzed, and revised later in the project.

### ***3.4.2 Stakeholder identification***

Defining the customers' purpose and constraints can sometimes be difficult. Because the stakeholders define the features and characteristics of the proposed project, most challenges stem from the requirements that the project stakeholders and the project environment place on the project. The definitions lead to the identification of which types of stakeholders are going to participate and should be involved in the project (Razali & Anwar 2011). There are no fixed rules regarding whom to identify and involve and how to involve them. However, the World Bank (1996) has determined some questions that can be used to guide project managers in identifying stakeholders:

- Who might be affected by the development concern to be addressed?
- Who are the 'voiceless' for whom special efforts may have to be made?
- Who are the representatives of those likely to be affected?

- Who is responsible for what is intended?
- Who is likely to mobilize for or against what is intended?
- Who can make what is intended more effective through their participation or less effective by their non-participation or outright opposition?
- Who can contribute financial and technical resources?
- Whose behavior has to change for the effort to succeed?

The project management must be aware of the different roles of the stakeholders in order to enhance the value creation of the project. Often, stakeholders are only divided into internal and external stakeholders, but this division is often too vague. Thus, stakeholders should be defined and identified according to their functional roles in a project, such as customer, contractor, end-user, sponsor, local community members, NGOs, media, lobbying organization, and government (Cova & Salle 2005).

### **3.4.3 Assessing stakeholder salience and probability to impact/ability to contribute**

Project stakeholders are very rarely equal, and hence their probability to impact or contribute to the project varies and is different. Ultimately, however, they influence the validity of the requirements, which aims to make sure that the requirements are consistent, complete, and correct for the project (Distanot 2013). Thus it is crucial that the project management assess the stakeholders' salience and their probability of impacting and contributing to the project.

The assessment can be done using the matrix shown in Figure 10, which is an adaptation of the impact/probability matrix modified by Olander (2007). Because stakeholder salience and the level of impact can be considered similar, the level of impact is changed to salience (vertical axis) in the matrix. Then it illustrates better that the more salient the stakeholder is, the higher the level of impact. The vertical axis describes the stakeholder groups in order of importance (Mitchell *et al.* 1997, Olander 2007, Agle *et al.* 1999) and the horizontal axis describes a stakeholder's probability to impact/ability to contribute to the project.

Compared to Olander's (2007) matrix, the order of the stakeholder positions has been changed to improve and highlight the reflection of stakeholder salience. In the (new) matrix, the stakeholder cannot be 'a key player' if it does not possess at least two salience attributes. When there is high salience, 'key players' are like (and are called later in this research) 'primary team members.'

The difference between ‘keep satisfied’ and ‘keep informed’ is volatile and fuzzy. However, often, the probability that ‘keep informed’ will (or wants to) impact or contribute to a project’s outcome is higher than ‘keep satisfied.’ That is why ‘keep informed’ can be regarded as ‘key supporting participants’ and ‘keep satisfied’ as ‘tertiary stakeholders.’ Tertiary stakeholders do not usually have a personal interest in the project while the key supporting participants may have, or at least they should have enough expertise and experience to positively contribute to the project.

Finally, the stakeholders possessing one attribute of salience are called ‘minimal effort’ (later referred to as ‘extended stakeholders’). Moreover, the matrix takes into account that the stakeholder’s active impact and contribution may affect that stakeholder’s position.

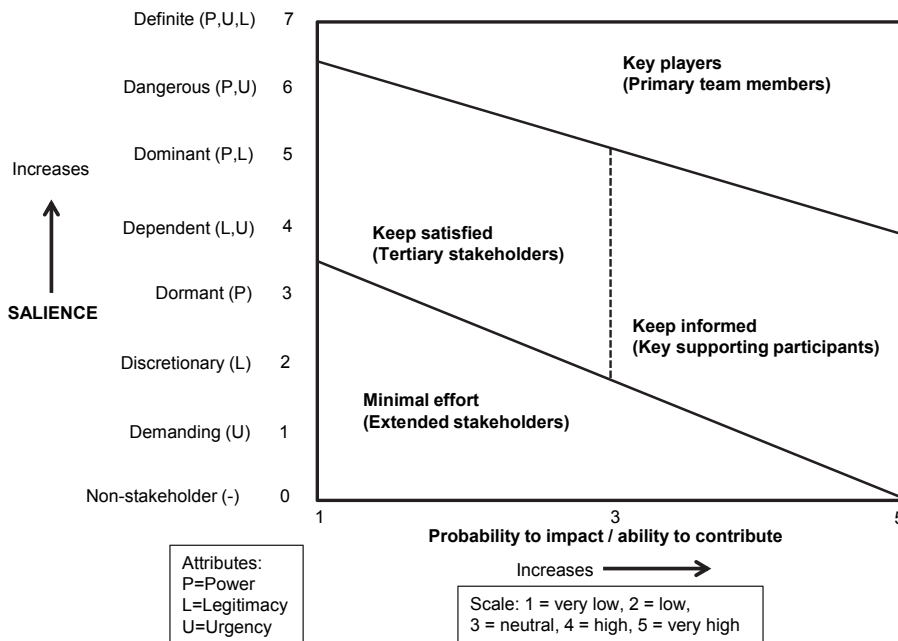


Fig. 10. Stakeholder assessment matrix (Aapaoja & Haapasalo 2014).

### 3.4.4 Stakeholder classification, prioritization, and team formation

All project stakeholders cannot be involved and considered equally, and therefore stakeholder classification and prioritization has to be established, in which certain

aspects of the stakeholders enable them to be at the top of the list (Razali & Anwar 2011). The project management must comprehensively exploit the information gained from all the previous phases in order to classify and prioritize the stakeholders effectively. Because of the unique nature of projects, some project-specific features may emphasize or reduce the importance and weight of some stakeholders, which should be determined when they are classified.

According to the theories of stakeholder management (e.g., Olander & Landin 2005, Johnson *et al.* 2008, McManus 2004) and RPDAs (e.g., AIA 2007, Ashcraft 2010), the classification and prioritization is as follows (classes are in order of importance):

- primary team members (who later form the project core group as well),
- key supporting participants,
- tertiary stakeholders, and
- extended stakeholders.

Primary team members (PTM) and key supporting participants (KSP) are the internal stakeholders of the project, while the last two, tertiary and extended stakeholders, represent the external stakeholders. Generally, the wants and needs of PTMs, KSPs, and tertiary stakeholders ‘must be dealt with’ so that the project may achieve its goals. When it comes to the extended stakeholders, project management seeks to balance some of their interests (McManus 2004). In sum, the project management should particularly strive to integrate the internal stakeholders and hence take advantage of their expertise.

Primary team members have substantial involvement and responsibilities throughout the whole project, and at the least, the customer, architect, and the main contractor represent the internal stakeholders. Naturally, other stakeholders can be PTMs as well. PTMs usually form a project core group, where the decision making is unanimous and conflicts are resolved. The core group includes representatives from all the PTMs (AIA 2007, Lichtig 2006), and thus its role is the most essential in the project and it is responsible for the management of project requirements throughout the project. There is no optimal size for the core group, but the size and composition is always project specific. Nonetheless, according to Hoegl (2005), effective teams consist of three to nine members, and the most effective teams usually have three to six members.

KSPs have a vital role, but they perform functions that are more discrete than the PTMs. KSPs usually include the consultants, subcontractors, and designers

(excluding the main designer). Since the KSPs' expertise and experiences can strongly affect the design and help the project to proceed smoothly, the PTMs must collaborate closely with them (Ashcraft 2010, AIA 2007). Therefore, the line between the PTMs and the KSPs is fine. For example, on the majority of projects, the structural designer is not a PTM because he or she normally performs discrete functions and is rarely substantially involved in the duration of the project. However, the structural designer can be a PTM if structural designing is in the central role and the structural designer has substantial responsibilities throughout the project (AIA 2007).

Additionally, large and complex projects include multiple external stakeholders who are not formal project members, and hence their role is not as central as the roles of PTMs or KSPs. However, because they expect and require something from the project, they can impact it, especially if they are ignored (Cova & Salle 2005). Thus it is crucial to identify them as well. Examples of external stakeholders are local community members, NGOs, media, lobbying organizations, public and governmental authorities (mandated by law), and sponsors.

External stakeholders can be further divided into two individual groups: tertiary and extended stakeholders. Tertiary stakeholders often provide input (e.g., regulations, norms) and even some resources (e.g., finance, logistics, supervising) that have to be considered so that the project can be executed and completed (Altschuld & Witkin 2000). Extended stakeholders, like media, NGOs, and local residents, do not have direct control over resources, but they may have a personal interest in the project (McManus 2004).

### **3.5 Results synthesis**

The overall objective of this dissertation is to enhance understanding of how value creation can be enhanced through project stakeholder identification, classification, and early involvement in the context of construction. First, the characteristics of and cornerstones for creating integrated teams were clarified. After that, stakeholder salience in construction projects was assessed and the defects in stakeholder management practices were revealed. In the third phase, the stakeholders that need to be involved early and the benefits of early stakeholder involvement in a renovation project were identified. Finally, a framework for stakeholder identification and classification was created to enhance the

stakeholder management and integration and also the value creation of construction projects. Table 10 summarizes the research results and contributions.

The construction industry has shifted from a single product focus to operating in a complex built environment. The results of this dissertation indicate that the changes in the construction industry have emphasized the need for more collaborative and interactive ways of working, like using RPDAs, especially in large and complex projects.

Generally, the benefits of RPDAs are based mainly on the many advantages that can be gained from the use of integrated teams, such as a mutual focus and objectives, team members having equal opportunity to contribute to the delivery process, no restrictions in information sharing, increased predictability of overall costs and schedule, and shared risks and benefits. Due to the fragmented and adversarial nature of the construction industry, creating integrated teams is a challenging task. Despite that, integration can be assisted through certain means.

**Table 10. Research summary.**

RQ#	Main results
I. Characteristic of and cornerstones for creating integrated teams	<ul style="list-style-type: none"> <li>Cornerstones for creating integrated teams</li> <li>Early stakeholder involvement and assessment</li> <li>Communication and interaction</li> <li>Cultural change</li> <li>To make RPDA process well known</li> </ul>
II. Assessment of stakeholder salience	<ul style="list-style-type: none"> <li>Revealing the defective stakeholder analysis and management practices in construction</li> <li>Need for more systematic and integrative approach for stakeholder management</li> </ul>
III. Early stakeholder involvement	<ul style="list-style-type: none"> <li>The benefits and purpose of early involvement</li> <li>Stakeholders to be involved early in projects</li> <li>The contribution of different stakeholders to the project</li> </ul>
IV. Framework for stakeholder identification and classification	<ul style="list-style-type: none"> <li>A framework for stakeholder identification and classification</li> <li>Defining the project's purpose and customer constraints</li> <li>Project stakeholder identification</li> <li>Stakeholder assessment</li> <li>Stakeholder classification and prioritization</li> </ul>

*Early stakeholder involvement and assessment* enables the identification of the most capable and essential stakeholders who may have contributions to the project outcome. *Communication and interaction* act as a basis for building trust between the stakeholders. Furthermore, the expertise of the stakeholders can be

exploited more efficiently if the stakeholders are encouraged to share information. *Cultural change* is mandatory if the benefits of integrated teams are to be brought out and exploited. Basically, it means that in RPDA, all the team members win or lose together. Hence they have to be committed to the mutual objectives, which demand that all decisions are made on the basis that they are ‘best for the project.’ On the other hand, the culture cannot be changed if there are no incentives for team members to do it. Thus, cultural change goes hand in hand with making *the process of RPDAs* better known, because usually the team members are collectively responsible for the project and thus the risks and rewards are shared. Ultimately, the collective responsibilities and risks and rewards are secured through one single contract that binds all the team members together.

The project management’s primary challenge is that a project needs to both consider and satisfy a variety of stakeholders and team members, which vary from project to project and are very rarely equal. At the moment, *the stakeholder assessment and management is mainly defective and non-systematic in construction*. For example, traditionally, the Finnish construction industry has strictly followed the national building code, in which stakeholders are presented as one fixed group. This simple management approach does not work in complex and dynamic environments anymore. Hence, there is an urgent *need for systematic processes for stakeholder identification, integration, and management* in the construction industry to consider specific features of the projects in more detail. A systematic process enables project management to identify, classify, and manage stakeholders to allow their key contributions to the project.

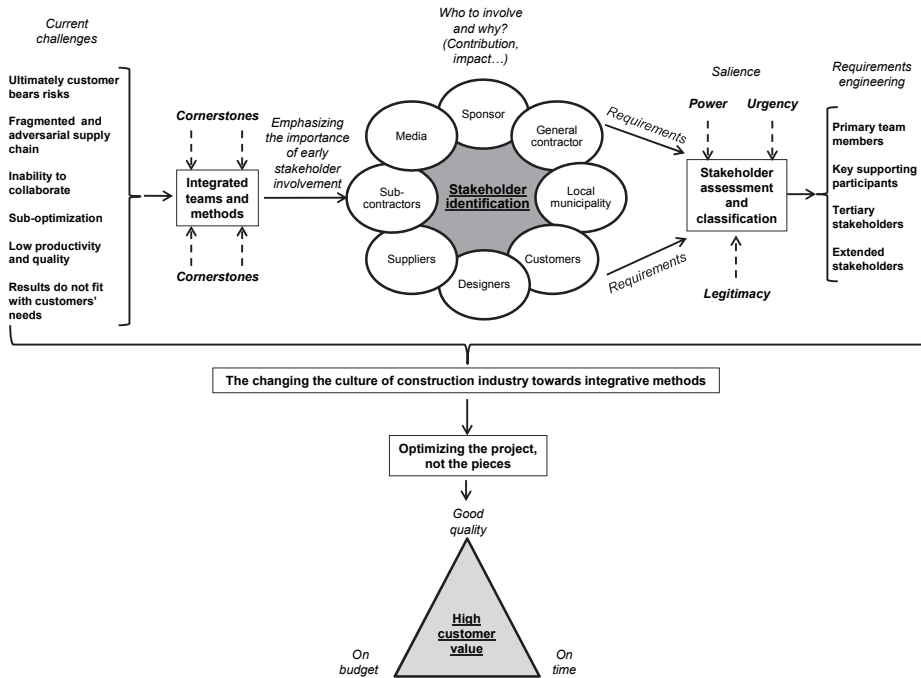
*The possibilities of influencing project success and value creation are perceived as the best during the early phases of the project*. Early decisions reduce unnecessary changes during later development phases and even the total costs of the lifecycle by considering contributions received from management, engineering, design, and construction. Thus stakeholders may help to identify solutions that can be most efficiently and effectively fit to the end product. *However, to maximize stakeholder contributions, project management identifies and involves the project’s key stakeholders immediately at the beginning of the project*.

While it is not possible to have a comprehensive list of actors who should always form the core group for the project management of construction projects, it appears that the customer, end-user, and the main designer should be represented in the core group. Generally, it can be argued that the core group should include stakeholder representatives who are highly salient and their ability

to contribute to the project outcome is high. *The main thing is to evaluate and understand the stakeholders from the perspective of the customer or to determine their relevance to the project.*

Stakeholders and their salience are always project-specific, and hence stakeholder identification, assessment, and classification must be performed separately in each project and managed according to the situation, but the stakeholders must also be given the opportunity to act as they see fit in a way that is best for the project. Therefore, this study introduces *a framework* that is designed to *identify and classify project stakeholders* in order to facilitate optimal contributions and project outcomes by identifying and consolidating the different roles and responsibilities of the stakeholders.

Figure 11 presents the synthesis of this research. In sum, at the moment, construction projects all over the world are suffering from poor quality, budget overruns, and delays. However, the results of this dissertation show that one viable way to address the current challenges is the use of integrated project teams and RPDAs. Probably the most important thing and the biggest change is early stakeholder involvement, because that can lead to the optimization of the whole project and its outcomes. Basically, early involvement forces the project management to map and identify all the potential stakeholders who may have influence on or contribute (positively or negatively) to the project. However, identification alone is not enough, rather it is essential to assess the stakeholders and classify (e.g., based on salience) them in order to engineer the requirements effectively. An effective engineering requirements process forms the foundation for value creation, which in turn means that the project's ultimate outcome aligns with the customer's needs and purposes.



**Fig. 11. Results synthesis.**

The results of this dissertation reveal several ideas for optimizing the value creation of construction projects. These key results enable the researcher to make the following recommendations:

1. Construction companies, and especially the customers, should demand the use of integrated team and project delivery methods. Otherwise, there is a risk that these methods and approaches will not be used, and hence, the ‘old’ culture and habits cannot be changed.
2. Companies should define and use a common and standardized process to identify, analyze, and classify the stakeholders in their projects. Each company should have a standardized process that fits in their project portfolio.
3. There should be a named person (‘process owner’) who has the responsibility as a key person to communicate with the stakeholders. The role should not be promoted by position, but rather because he or she really plays a vital role in the project network.

4. The responsibilities of the involved stakeholders should be defined. It helps, with standardized processes, for stakeholders to have a clear vision and mission of what they have to do and how to do it.
5. The selection of stakeholders (e.g., architects, engineers, contractors, subcontractors) should not be based on price alone (e.g., by choosing the lowest cost tender), but rather on competence, capability, and expertise. In addition, the projects and stakeholders should utilize existing relationships, but also build long-term relationships with other stakeholders. Good relationships help to build trust and increase natural communication and interaction, which ultimately leads to smooth and successful collaboration. Additionally, it helps and accelerates the cultural change within the industry.
6. Customer requirements are the link between the customers and the project stakeholders. However, customers are not typically construction experts and they rarely know their ultimate needs and wants. Therefore, customers should involve experts from different fields to help in defining the project's purpose. Although it creates costs, they are insignificant compared to the lifecycle costs. Additionally, the project cannot be procured and delivered effectively if the ultimate purpose is not clear.
7. In addition to the needs and wants, it is essential to define the constraints as well. Otherwise, finding the most suitable means to deliver the project and meet the project purpose is not possible.

## 4 Discussion

### 4.1 Theoretical implications

From the theoretical point of view, this dissertation mainly contributes to project stakeholder management and integration theory in construction. This is done by research on enhancing the value creation of construction projects through early stakeholder involvement and integrated project teams (IPT).

The dissertation contributes by discussing the characteristics of integrated teams and the cornerstones for creating integrated teams. This research also revealed that there are no systematic stakeholder management and assessment processes in construction. Hence there is an urgent need for theory to be developed to guide improved practice around stakeholder integration and value creation.

The study also provides new knowledge for construction projects about the benefits of early stakeholder involvement and the contributions and expertise that the project may benefit from if the stakeholders are involved. Ultimately, the research introduces a framework that facilitates stakeholder management and involvement starting from the identification of the project purpose and customers' constraints and ending with stakeholder classification and prioritization.

This dissertation contributes theoretically through the following issues: *cornerstones for creating an integrated team, stakeholder salience in a construction project, early stakeholder involvement in the project definition phase, and framework for stakeholder identification and classification.*

*Cornerstones for creating an integrated team:* The first article discussed the nature of integrated project delivery methods and integrated project teams while the main focus was to identify the most common characteristics of and cornerstones for creating integrated teams. Our research confirmed that the 12 most common characteristics of integrated teams were identified from the current literature (e.g., Lahdenperä 2012, Dainty *et al.* 2001, Love *et al.* 1998, Baiden *et al.* 2003), while the cornerstones for creating integrated teams were found in the case study. The cornerstones are somewhat consistent with the earlier studies (e.g., Olander & Landin 2005, Brady & Davies 2011, Aaltonen & Kujala 2010), but this research provides a comprehensive view of what is needed to create an integrated team and how the different cornerstones are connected to each other. Therefore, it should be noted that, in theory, the cornerstones of creating integrated teams

should be understood and discussed as a single entity, whereas they have usually been treated more individually. Additionally, this research provides new theoretical knowledge by confirming the validity of the cornerstones for creating integrated teams in construction projects.

*Stakeholder salience in a construction project:* The second article clarified the salience of different stakeholders in a Finnish construction project. The salience was assessed through Mitchell *et al.*'s (1997) salience framework. This supports the findings of the previous studies (e.g., Mitchell *et al.* 1997, Agle *et al.* 1999, Olander 2007, Aaltonen 2010) in the fact that the project stakeholders in construction are not equal and their salience varies. However, this study contributes to theory by addressing the huge difference in salience between internal and external stakeholders. The findings of this study also imply that the theory of stakeholder management has not recognized the importance of systematic approaches to stakeholder analysis and management (including stakeholder identification, classification, and prioritization) and their relationships to requirements engineering well enough. Therefore, this study suggests that stakeholder management theory should focus more on systematic stakeholder management, but it should also be extended to cover the relationships between requirements engineering and systematic project stakeholder management and involvement.

In his research, Saarenpää (2010) found out that following only the national building code of Finland (NBCF) (Building information ltd. 1989) in construction projects, just mediocre quality can be produced. This study supports Saarenpää's (2010) findings, but also discovered that the limited and fixed view of stakeholders in the NBCF is one reason for the poor quality. Hence, this study implies that stakeholder analysis and assessment must be done separately in each project.

*Early stakeholder involvement in the project definition phase:* This article contributes to the field of early stakeholder involvement. Like several previous studies (e.g., Möttönen *et al.* 2009, Lehto *et al.* 2011, Dowlatshahi 1998, van Valkenburg *et al.* 2008), this research also emphasizes and confirms the benefits of early stakeholder and supplier involvement to value creation in general. However, the stakeholders to be involved have been overlooked in the current literature, but this research provides new knowledge about them. This paper identifies the stakeholders that should be involved right in the project definition phase and the contribution that they may have to the project. Based on the findings, the major theoretical implication of this study is that the theory of early

stakeholder involvement needs to be extended to consider the role and the contribution of every single stakeholder in more detail. It is not enough to be concerned only with the benefits that early involvement provides if the stakeholders that should be involved are not known.

*Framework for stakeholder identification and classification:* The last article contributes theoretically to the field of stakeholder management, and especially to the identification, classification, and prioritization of the stakeholders during the project's initiation. This research complements previous studies (e.g., Mitchell *et al.* 1997, Olander 2007, Brady *et al.* 2005, Razali & Anwar 2011, Aaltonen 2010, AIA 2007) by providing a more systematic process to overcome the gap that no systematic processes and frameworks have been developed for stakeholder management or for requirements engineering in the construction industry. By merging the requirements engineering process with stakeholder management, this research provides new theoretical knowledge about the importance of systematic stakeholder identification, classification, and prioritization to effective requirements engineering. Moreover, because project stakeholders cannot be managed as a homogenous group, this research complements the previous studies (e.g., Johnson *et al.* 2008, Olander 2007) by providing a new kind of matrix for assessing stakeholders' salience and abilities to impact or contribute to the project.

This dissertation, in general, provides new knowledge by studying integrated project teams and early stakeholder involvement in construction through more systematic, active, and interactive stakeholder integration and management. Thus, this study presents a deeper and better understanding of how the value creation of construction projects can be enhanced through creating integrated teams and systematic stakeholder management and involvement by discussing the cornerstones for creating integrated teams, pointing out that the project stakeholders are not equal and thus they should be managed in a way that better reflects their roles, providing new information about the stakeholders who should be involved in the project definition phase, and constructing a framework for stakeholder identification and classification.

## **4.2 Practical implications**

This dissertation contributes to project stakeholder integration, early involvement, and project-specific stakeholder management approaches. The idea is to recognize how project management could manage and integrate the project stakeholders more systematically in order to improve and optimize the project outcomes. The

research not only contributes to better project stakeholder management, but also increases the knowledge of the benefits of integrated project teams, early stakeholder involvement, and stakeholder collaboration to the project outcomes. In ideal situations, this increased knowledge and understanding has practical implications and thus may improve the situation in practice.

The studied phenomenon itself is current and important because construction projects nowadays are implemented mainly in highly demanding and complex built environments, where the focus is not on providing a single product but a variety of services to the built environment around the project. Therefore, new approaches also require new kinds of project delivery and management methods, but the fragmented and adversarial nature of the construction industry restricts their development and adaptation.

On a general level, the practical implications of this dissertation are connected to the following issues: *cornerstones for creating an integrated team, stakeholder salience in a construction project, early stakeholder involvement in the project definition phase, and framework for stakeholder identification and classification.*

*Cornerstones for creating an integrated team:* This paper explains the nature of integrated project teams and the most essential characteristics that separate normal project teams from integrated project teams. It not only contributes to a better understanding about an IPT, but also provides insights into what the cornerstones for creating an IPT are. It also reveals some challenges in creating integrated teams. The finding of this study implies that a better understanding of RPDA is needed among project management, managers, and construction workers. Therefore, to increase the commitment to RPDA, a high level of collaboration, communication, and information sharing is required. Ultimately, this leads to an increased level of trust, and to a deeper integration of the project stakeholders. Naturally, some stakeholders are unsuitable for working in a RPDA way, and hence project management should pay attention to the selection of suppliers. The establishment of integrated teams requires great effort, so that the most capable and committed stakeholders can be chosen to carry out the project.

*Stakeholder salience in a construction project:* This article studies the assessment of stakeholder salience in a case construction project, but also the suitability of the national building code of Finland (NBCF) for project stakeholder management by assessing the salience of the different project stakeholders.

The findings show that the NBCF alone cannot be used for stakeholder management, because it identifies only a fraction of the stakeholders connected to a project, especially when considering complex projects. Moreover, the NBCF does not classify stakeholders at all, and therefore, stakeholders cannot be managed effectively with it, because the salience of the stakeholders varies both within a project and from project to project. Thus it can be argued that the NBCF is way too narrow, generic, and non-adaptive to be used as a basis for effective project stakeholder management, especially nowadays when projects are implemented in highly complex environments that may include tens of different stakeholders. The major practical implication of this research is that construction practitioners should start to identify and assess stakeholders more actively right from the initiation of the projects because most of the value is created in the design phase. Although stakeholders are not equal (salience varies), the stakeholders' suggestions and proposals (aka the 'voice' of the stakeholders) should be listened to carefully, because they may have valuable contributions to the value creation of the project. In the worst case, ignoring the stakeholder can lead to a situation where the stakeholder tries to prevent or harm the project.

*Early stakeholder involvement in the project definition phase:* In this paper, the snowball sampling method was used for the project stakeholder identification. The results imply that the method is particularly useful in circumstances (e.g., construction projects) where the issue and its environment are complex and unclear (e.g., the project stakeholders). The most important benefits of snowball sampling are related to its ease of use and its comprehensive approach, which aims to take into account everyone that may have an impact on the issue.

The results imply that stakeholder involvement starts by evaluating and understanding project stakeholders from the perspective of a project organization, or evaluating their relevance to a project. In carrying out the analysis, questions are asked about the positions, interests, impact, interrelations, networks, and other characteristics of the stakeholders, with reference to their past and present positions and also to their future potential.

This paper also provides in-depth research of how early stakeholder involvement makes a positive contribution to the project outcomes by exploiting the know-how of stakeholders and understanding the contributions of individual stakeholders. Additionally, although the project stakeholders should always be involved early, the benefits of early involvement cannot be fully exploited without using integrative project delivery methods, because in principle, they emphasize

early involvement and especially the importance of key stakeholders for the project.

*Framework for stakeholder identification and classification:* This paper creates a framework for project stakeholder identification, classification, and prioritization. Appropriate stakeholder identification, classification, and management are crucial in order to collect and manage the stakeholder requirements, and any misjudgment in this process could lead to project failure. Therefore, the framework was presented to facilitate the systematic identification, classification, and management of project stakeholders in terms of the functional role of project stakeholders, and their salience and probability to impact and ability to contribute to the project.

The application of the framework focuses particularly on the possibilities of influencing project success and value creation during the early project phases. The framework has the potential to improve the value creation of projects by systematizing stakeholder identification, classification, prioritization, and involvement. The framework may have significant value for not only the customer, but also all other stakeholders, particularly in projects that include special features. It is essential that projects be 'on the rails' right from the beginning in order to avoid changes and reworking.

Additionally, the last paper and the presented framework summarize the whole idea of this dissertation: to manage and enhance the value creation of the project, it is crucial to have a systematic and comprehensive process for stakeholder management that strives toward early stakeholder involvement and integration. Hence the framework has the potential to assist projects to exploit stakeholder expertise comprehensively. The dissertation further emphasizes the view that stakeholders are always project specific, and there are no fixed rules regarding whom to involve, hence the stakeholder management approaches should be more active and systematically take into account the project's specific features and conditions.

### **4.3 Reliability and validity**

Like qualitative research usually, this research seeks to understand a particular phenomenon rather than generalize it, and hence this research can be considered as qualitative. In this dissertation, the case study strategy was selected among a large variety of methods used in qualitative research, because case study allows

for the study of a phenomenon in its situation but also provides a broad view of the phenomenon.

Reliability and validity are the two main aspects to be concerned with while designing qualitative research (Creswell 2009). Table 11 summarizes the actions that were taken in order to increase and reach the reliability and validity in this research.

**Table 11. Ensuring the reliability and validity of this research.**

Aspect	Task carried out in this research	Research phase when the task was undertaken
Reliability	Followed the same interview set up and procedure in every interview.	Research design and data collection
	Standardized data collection methods – survey and semi-structured interviews.	Data collection
	Recorded, transcribed, and stored data.	Data collection
	The data, data analysis, and drafts were reviewed and commented on by the interviewees and other researchers.	Data analysis
Construct validity	Used data triangulation.	Data collection
	The data, data analysis, and drafts were reviewed and commented on by the interviewees and other researchers.	Data analysis
External validity	Defined the scope and boundaries of the research (case companies, number of interviewees, data collection methods) clearly.	Research design
	Compared the results with the current literature and research.	Data analysis
Internal validity	Different efforts to encourage the honesty of interviewees.	Data collection
	Let the interviewees check the collected and transcribed data.	Data analysis
	Discussed the research approaches and results with the supervisor and other researchers.	Research design and data analysis
	Used double-blind review process in journal articles.	Dissemination

### **4.3.1 Reliability**

*Reliability* is the degree to which the results of the research correspond with the real world. In addition, reliability concerns the consistency of approach of the research across the different researchers and projects (Creswell 2009). Reliability can be increased in many ways, for example, by standardizing data collecting methods, recording and transcribing the data, and using several researchers (Yin 2009).

In this research, the researcher enhanced the reliability in various ways and used several data collection methods (interviews and survey). The main reason for selecting the interview method was its usefulness in explaining the studied context (Yin 2009). The survey method was chosen because the studied case was in the USA and the researcher was not able to go there and do face-to-face interviews. In addition, the survey method was believed to produce more reliable and unambiguous results in that particular case. The same data collection procedure and interview set up was used for each interview. The interviews were conducted mainly through semi-structured interviews, because the results are relatively easy to analyze, but this also left some room for interaction between an interviewer and interviewee(s). The reliability was also increased by recording, transcribing, and storing the collected data, as well as using two interviewers when it was possible.

The selection of the case and representatives (e.g., interviewees) is one of the most essential things in case studies (Yin 2009). In this research, the cases are mainly from the Finnish construction industry, but there is also one case from the USA as well. The case selection was based on the fact that the case projects (except for the school and kindergarten project presented in the second article) were using integrated teams and/or integrated project deliveries or they were interested in using those in the future. However, the case for the second article was chosen because it was carried out using a lifecycle model, which increases the project's complexity and the number of stakeholders in the project, and hence set new challenges for stakeholder management.

The unique nature of these projects and project business sets challenges for the repeatability of this research, which aims to enable someone else to repeat the research and get similar kinds of results (Yin 2009). It would be unlikely that some other researchers could get exactly the same results. Saunders *et al.* (2009) stated that findings reflect the reality at the time when the data was collected. Thus the repeatability of this research is limited, primarily because:

- projects proceed all the time, and thus the situations and practices usually evolve and change,
- interviews are always unique situations, thus with time the opinions of the interviewees may change even though the same questions are asked, and
- the role of the researcher is remarkable in the analysis, and the conclusions are more or less interpretations of the researcher, even though the steps of the data analysis can be repeated.

However, the research process could be repeated with different projects, since the studied issues – stakeholder salience and so on – are relevant to all projects. In addition, another researcher could use the same research instruments again, albeit in a different project setting.

Research should always be as objective as possible. Objectivism aims to minimize the influence of the researcher's own values on the results. Despite that, qualitative research usually includes a subjectivism connotation, because qualitative research is often based on interpretations, especially in cases where interviews are used in the data collection (Yin 2009). Thus, repeating the same research in other projects could probably provide at least slightly different results and findings.

### **4.3.2 Validity**

Validity concerns the degree to which the findings and results are interpreted in a correct way. Basically it means that the researcher checks the accuracy of the results by using suitable procedures (Creswell 2009). Validity can be discussed from three perspectives: construct validity, external validity, and internal validity.

*Construct validity* refers to establishing appropriate research settings for the concepts being studied. Construct validity can be enhanced through three ways: using multiple sources of evidence in the data collection, establishing a chain of evidence, and letting key informants and the research assistant review a report draft (Yin 2009).

The validity of this research was increased by applying the above ways. The construct validity of all of the research and the cases was increased by selecting as many stakeholder representatives from different roles in the projects as possible (data triangulation). Data triangulation means that the same issue is studied from various perspectives that complement and verify each other. Also, new interviews were conducted – all the available case project stakeholders were interviewed – until no new information appeared, by that ensuring the reliability of the collected data. As mentioned earlier, two interviewers were used when possible, and all the collected data and materials were recorded and transcribed. The reports and draft were reviewed by the informants and interviewees.

*External validity* relates to the ability to apply the research results to other contexts. In other words, external validity is mainly concerned with the generalization of the results. However, in qualitative research, generalization is often limited and challenging, and hence there is no intent to generalize the results,

but rather to discuss and explore the studied phenomenon in the selected context. External validity can be increased by defining the research scope and boundaries carefully and comparing the findings and results to previous literature and research (Yin 2009, Eisenhardt 1989).

In this research, the boundaries were clearly defined by the researcher. Defined boundaries included the number of case companies participating in the research, their operation environment, the roles and positions of the interviewees, the number of interviewees involved in this research, and the data collection methods used. The same criteria were used in each case study.

This research was conducted in the construction industry, in companies of medium and large sizes. All of these companies have long histories and much experience in the construction industry, and they have been active in developing their businesses and project procurement and delivery methods. The interviewees were carefully selected on the basis of their essential roles in the case projects, professional experience (typically 10–30 years), and their current interests.

Generalizing the results of this research is challenging. The nature of a project sets some challenges, and when the industrial field (e.g., high technology) changes, usually all the processes are so different that the results are not directly suitable for contexts. However, external validity can be increased through giving a definition of the scope and boundaries, and making a comparison of results with current literature (Eisenhardt 1989; Yin 2009). The literature review was conducted at the beginning of this research. In the current literature, early stakeholder/supplier involvement and stakeholder management, as well as stakeholder identification, has received a lot of attention in recent years in the field of product development, for example, by applying the DfX method. Moreover, project stakeholder management, involvement, and requirements engineering activities are always essential in any field. The results of this research are somewhat parallel to these examples, and thus this research creates new knowledge about the studied topic.

*Internal validity* considers the research results as less important than the process of finding out. The credibility of the researcher is evaluated by the people who participate in the research. Thus, internal validity is achieved when the research participants see the results as believable. The internal validity of this research was increased in the following ways:

- During the data collection, the interviewees were encouraged to be honest. For example, the interview questions were objective, and they were carefully

- explained to the interviewees. It was also emphasized that there were no right or wrong answers. All the collected research material was also handled with confidentiality and anonymity so that the interviewees could discuss the questions without fear that their personal opinions would be exposed publicly.
- In order to increase the accuracy of the data, the transcribed data was checked by the interviewees in order to reveal any possible incorrect interpretations.
  - The research approaches were discussed and the data analysis was conducted with the supervisor and other researchers. The discussions and new perspectives helped to obtain a broader perspective on the research, results, and critique.
  - Double-blind review: each journal article included in this research was reviewed and commented on by the members of the journal and scientific community. The research was improved and developed according to the provided feedback.

#### **4.4 Recommendations for further research**

Research and studies are always limited in terms of scale, scope, and boundaries. This research focuses on enhancing the value creation of projects through integrated teams and early stakeholder involvement in construction projects. Although the research contributes both theoretically and practically, there are several possibilities for further research and research extension.

Since the cornerstones of creating integrated teams are crucial and may help to increase the level of stakeholder and team integration, further research could focus on studying the impact of cornerstones on the level of integration if these were applied systematically. In addition, following the development of team integration during a project or measuring the level of integration (and finding the differences) in several projects would be worth studying as well.

RPDAs are mostly considered to be project delivery methods in the current literature. However, project procurement methods, especially in the case of public procurement, inevitably have an impact on project delivery. Therefore research should be conducted that discusses how procurement methods impact project delivery, and how procurement could be changed in order to increase delivery efficiency.

Furthermore, early involvement is a huge issue at the moment. In the third article, the stakeholder to be involved early was studied. Because the research was conducted before the case project really started, the results were basically good

'guesses' of who the stakeholders to be involved would be. Thus, it would be valuable to study how and to what extent stakeholder involvement was really executed after the case project is completed.

Earlier, in the results synthesis, it was recommended that there should be 'a process owner' who is responsible for the communication and interaction between the project participants and stakeholders. Consequently, future research should try to define on what basis such a person should be chosen, because the role should be based on the capabilities and expertise, not the official position in a project.

The most important areas for further research are connected to the validation and improvement of the proposed framework through several new studies. In particular, future studies should focus on the dynamic nature of stakeholder salience and how the changes in the salience of a stakeholder could be predicted or what kind of impact the variation of salience has on a project. Basically, this means that the framework must be applied and used throughout an entire project, from the feasibility study to initialization, to focus on the stakeholders. Future findings could contribute to improving the framework to include changes within the stakeholders during the project's lifecycle. Finally, the operational aspects of the framework need to be formulated as a simple technical procedure to guide practitioners in its use.

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- I Aapaoja A, Herrala M, Pekuri A & Haapasalo H (2013) Characteristics of and cornerstones for creating integrated teams. *International Journal of Managing Projects in Business* 6(4): 695–713.
- II Aapaoja A, Kinnunen T & Haapasalo H (In press) Stakeholder salience assessment for construction project initiation. *International Journal of Performance Measurement*.
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