

Aalto University
School of Science
Master's Programme in Industrial Engineering and Management

Otto Matias Linkoaho

Commercial Management of Projects

Master's Thesis
Espoo, 25.05.2020

Supervisor: Karlos Artto, Professor, Aalto University

Advisors: Johannes Koschnick, M.B.A.
Mikko Rantaharju, M.Sc. (Tech)

Author: Otto Matias Linkoaho		
Title: Commercial Management of Projects		
Supervisor: Karlos Artto Advisors: Johannes Koschnick, Mikko Rantaharju		
Major: Operations and Service Management		Code: SCI3049
Date: 25.05.2020	Pages: 110 + 3	Language: English
<p>There is a growing interest in commercial management in project execution. Research questions of the thesis are: how can commercial management activities be effectively organized to support project execution, and how the commercial manager role affects the success of projects. The research contributes to project management literature, particularly from commercial viewpoint. The research method is to empirically study with a mixed-method approach commercial management throughout the case firm's project execution. The case firm is a mining and metallurgical technology company providing equipment and complex plant projects. The qualitative part includes five case projects with commercial manager and three reference projects without commercial manager. In the quantitative part, 42 projects are analyzed, part of which having an appointed commercial manager.</p> <p>The empirical study suggests that project characteristics, such as the client, country, and contract type, generate the need and the shape for the commercial manager role. Commercial manager acts as an integrator of commercial topics, while input and involvement is required from respective project roles and support functions. The core of the role incorporates financial, change, claim, and risk management. In addition, supportive actions are required in sales phase, client relationship and communication management, and procurement. Commercial manager enables project manager to concentrate on holistic management, reduces the need for commercial knowledge transfer from support functions, and fosters commercial expertise within the project team. The thesis provides a model for statistical analysis. Obtained results are, however, not statistically significant, due to insufficient sample size. Nevertheless, the related proposition for variables and metrics lays a foundation for further studies with sufficient population of project samples.</p> <p>New knowledge is provided on commercial manager's activities and the involvement of the role in these activities, as well as on success metrics of effective commercial management. For the case firm, the generic role description, as well as success metrics, are proposed to support global role implementation. Individual bias of case projects, limited variation in project characteristics, and small sample size constrain the reliability and the applicability of the empirical study. Hence, results are generalizable for major and complex projects only. The thesis provides a fair basis for future research in project-specific factors' impact on the commercial manager role, and financial implications of effective commercial management.</p>		
Keywords: commercial management, commercial manager, financial success, project-based business, project management		

Tekijä: Otto Matias Linkoaho		
Nimi: Projektin kaupallinen johtaminen		
Valvoja: Karlos Artto Ohjaajat: Johannes Koschnick, Mikko Rantaharju		
Pääaine: Operations and Service Management		Koodi: SCI3049
Päiväys: 25.05.2020	Sivumäärä: 110 + 3	Kieli: englanti
<p>Kaupallinen näkökulma on korostuvasti esillä nykypäivän projektijohtamisessa. Tämän diplomityön tutkimuskysymykset ovat: miten kaupallinen johtaminen tukee tehokkaasti projektin toteutusta, ja millainen vaikutus kaupallisen projektipäällikön roolilla on projektien menestykseen. Tutkielma edistää projektihallinnan ja projektien kaupallisen johtamisen tutkimusta. Aihetta tutkittiin empiirisesti kvalitatiivisin ja kvantitatiivisin menetelmin kohdeyrityksen projektitoteutuksen kautta. Kohdeyrityksen ydinliiketoiminta on laite- ja tehdasprojektien myynti, suunnittelu ja toteutus mineraalien ja metallien prosessointiin. Kvalitatiiviseen tutkimukseen valittiin viisi case-projektia, joissa kaupallisen projektipäällikön roolia sovellettiin sekä kolme vertailuprojektia ilman kyseistä roolia. Kvantitatiivinen tutkimus koostui 42 projektista, joista osassa rooli oli mukana.</p> <p>Empiirinen tutkimus osoitti projektimuuttujien, kuten asiakas, maa ja sopimustyyppi, vaikuttavan kaupallisen projektipäällikön tarpeeseen sekä hänen roolinsa sisältöön. Kaupallinen projektipäällikkö toimii kaupallisen johtamisen kokoonpanevana voimana varmistaen asianmukaisen panostuksen muilta projektirooleilta. Hänen vastuullaan on projektin talouden, muutosten ja riskien hallinta. Lisäksi projektin myyntivaiheessa, asiakassuhteiden ja -viestinnän hallinnassa sekä hankinnoissa roolitehtävänä on tukea muuta projektitiimiä. Kaupallisen projektipäällikön nimittäminen mahdollistaa projektipäällikön keskittymisen projektin kokonaisuuden hallintaan, vähentää tarvetta projektin ulkopuolisen tukitoiminto-osaamisen hyödyntämiseen sekä kasvattaa projektihenkilöstön kaupallista osaamista. Diplomityössä on esitetty malli tilastolliseen analyysiin, mutta tulokset eivät olleet tilastollisesti merkittäviä otoskoon vähäisyyden seurauksena. Ehdotus mallin muuttujista ja mittareista luo kuitenkin perustan tuleville tutkimuksille.</p> <p>Tutkielma luo uutta tietoa kaupallisen projektipäällikön tehtävistä ja niiden toteutuksesta sekä onnistuneen kaupallisen johtamisen mittareista. Ehdotettu roolikuvaus ja sovellettavat mittarit avustavat tutkimusyritystä roolin perustamisessa. Case-projektien vähäinen määrä ja tarkastelun rajaaminen vain yhteen toimittavaan liiketoimintayksikköön heikensivät tutkimuksen merkitsevyyttä ja tutkimustulosten käytettävyyttä. Tulokset ovat yleistettävissä pääasiassa suuriin ja monimutkaisiin projekteihin. Diplomityö tarjoaa pohjan tulevalle tutkimukselle projektiriippuvaisten tekijöiden vaikutuksista kaupallisen projektipäällikön rooliin sekä tehokkaan kaupallisen johtamisen vaikutuksista projektin taloudelliseen onnistumiseen.</p>		
Avainsanat: kaupallinen johtaminen, kaupallinen projektipäällikkö, taloudellinen menestys, projektiliiketoiminta, projektihallinta		

Acknowledgements

I am grateful of having had the opportunity and a great honor to be accompanied by several key contributors along this thesis journey.

First of all, I would like to express my gratitude to the case firm providing the inspiring opportunity for this thesis. Especially, I am thankful for Johannes, Mikko, and Janne for constructive and professional support throughout the whole process. The flexibility during the thesis made it possible for me to simultaneously practice and compete, which was in high importance for me. In addition, I appreciate all efforts of interviewees and other colleagues helping me collect, verify, and analyze the empirical data.

Secondly, I really appreciate the encouraging guidance from my supervisor Karlos, and his team. He was available whenever I needed help and always responded very quickly and comprehensively. The feedback was integral and vital for achieving to complete such a cohesive and complete thesis.

Finally, I would like to expose my appreciation to my girlfriend, family, and friends. They supported me throughout the entire journey, especially when I felt things complicated and challenging and my stress level was rising. Such a mental support was invaluable, since it was essential to frequently get my mind out of the thesis.

Helsinki, May 25, 2020

A handwritten signature in black ink, appearing to read 'ML', with a long horizontal flourish extending to the right.

Matias Linkoaho

Table of Contents

ABSTRACT

ACKNOWLEDGEMENTS

LIST OF FIGURES

LIST OF TABLES

1	INTRODUCTION	1
1.1	THE CASE FIRM AND ITS PERSPECTIVE TO COMMERCIAL MANAGEMENT.....	1
1.2	THEORETICAL IMPORTANCE	2
1.3	RESEARCH QUESTIONS	4
1.4	RESEARCH METHOD	6
1.5	STRUCTURE OF THE THESIS	7
2	THEORETICAL BACKGROUND	8
2.1	PROJECTS IN PROJECT-BASED BUSINESS	8
2.2	COMMERCIAL MANAGEMENT IN PROJECT-BASED BUSINESS	11
2.3	COMMERCIAL SUCCESS OF PROJECTS	23
2.4	COMMERCIAL MANAGER'S ROLE	29
3	METHODOLOGY.....	34
3.1	RESEARCH PROCESS.....	34
3.2	QUALITATIVE RESEARCH	35
3.3	QUANTITATIVE RESEARCH	39
4	RESULTS.....	42
4.1	EXECUTION OF CASE PROJECTS FROM COMMERCIAL PERSPECTIVE	42
4.2	COMMERCIAL MANAGEMENT AREAS ORGANIZED IN CASE PROJECTS	59
4.3	COMMERCIAL MANAGER'S RESPONSIBILITIES IN CASE PROJECTS	62
4.4	COMMERCIAL MANAGER'S PERCEIVED INVOLVEMENT IN CASE PROJECTS.....	78
4.5	COMMERCIAL MANAGEMENT IN REFERENCE PROJECTS WITHOUT COMMERCIAL MANAGER.....	83
4.6	COMMERCIAL MANAGER'S IMPACT ON PROJECT PERFORMANCE.....	85
5	DISCUSSION.....	93
5.1	CONCLUSIONS	93
5.2	PRACTICAL IMPLICATIONS.....	99
5.3	THEORETICAL IMPLICATIONS	102
5.4	LIMITATIONS.....	104
5.5	FURTHER RESEARCH	106
6	REFERENCES	107
7	APPENDIXES	I
7.1	APPENDIX I: THE INTERVIEW QUESTIONNAIRE	I
7.2	APPENDIX II: THE INTERVIEW TEMPLATE 1	III
7.3	APPENDIX III: THE INTERVIEW TEMPLATE 2	III

List of Figures

- Figure 1: Common client-contractor-supplier structure in construction.*
- Figure 2: Three levels of project life cycle view.*
- Figure 3: A model of commercial management including related management areas.*
- Figure 4: Commercial management and its interfaces with other disciplines in managing complex projects.*
- Figure 5: Commercial management and related management areas in this thesis.*
- Figure 6: A development of uncertainty in a project from inception to completion.*
- Figure 7: An ability and costs for changes in a project over time.*
- Figure 8: A project in relation to client's core business.*
- Figure 9: The project triangle.*
- Figure 10: The five-dimensional project success framework.*
- Figure 11: The research process.*

List of Tables

Table 1:	<i>Key performance indicators in the construction industry.</i>
Table 2:	<i>Key performance indicators for measuring the financial success of partnering.</i>
Table 3:	<i>Activities of a commercial manager.</i>
Table 4:	<i>Activity-based competences required from a commercial manager.</i>
Table 5:	<i>The qualitative data of the research.</i>
Table 6:	<i>Case and reference projects, interviewed roles in those, and key characteristics of projects.</i>
Table 7:	<i>Variables of the quantitative model.</i>
Table 8:	<i>Selected case projects and their key parameters.</i>
Table 9:	<i>Project characteristics affecting the role and the success of commercial management.</i>
Table 10:	<i>Project roles and their involvement in different commercial management areas in case projects.</i>
Table 11:	<i>Key characteristics and involvements of the commercial manager in case projects.</i>
Table 12:	<i>Involvement levels of the commercial manager in commercial activities in case projects.</i>
Table 13:	<i>Additional activities that multiple project and commercial managers highlighted.</i>
Table 14:	<i>Expectations of the involvement of the commercial manager in commercial activities from three perspectives.</i>
Table 15:	<i>The regression table for the proportional amount of change orders.</i>
Table 16:	<i>The regression table for the change order profitability.</i>
Table 17:	<i>The regression table for the margin development.</i>
Table 18:	<i>The average-based analysis in selected metrics for each variable.</i>
Table 19:	<i>Proposed key performance indicators for measuring the success of commercial management of a project.</i>
Table 20:	<i>Major observations and conclusion statements of the thesis.</i>
Table 21:	<i>The proposition of the role description for the commercial manager role.</i>

1 Introduction

The topic of this thesis is commercial management in projects. It is studied since there is a growing interest within academic society and a unique research possibility provided by the case firm. The thesis proceeds as follows. Chapter 1 provides the motivation for this thesis, from both academic society's and the case firm's perspectives to the research of commercial management. It summarizes academic literature forming a theoretical basis for this research. The chapter outlines developmental needs of the case firm in this area and a lack of knowledge in existing research. Research questions and the scope of the study are described. Finally, this chapter presents the structure of the thesis.

1.1 The case firm and its perspective to commercial management

The case firm is a technology and service company, listed in Finnish stock, providing complex mining and metallurgical technologies through equipment and plant projects. Projects are designed in-house and executed in collaboration with third party suppliers and subcontractors. The firm operates globally incorporating entities in each continent and having sales and service centers in 36 countries. The business is divided into two business units, nearly equal at size, and the product portfolio consist of metals and mineral processing machinery and process engineering.

The case firm is implementing globally a new commercial manager role within their project execution. The aim is to apply the role at first in major or otherwise complex projects. The commercial manager is set to operate in collaboration with the project manager in the lead of the project managing mostly commercial and contractual issues. In addition, the commercial manager will be closely related to the project controller, representing the financial lead of the project.

Currently, the commercial manager role has been applied in projects executed in the case firm's Germany entity for decades. Major projects have traditionally been implemented with parallel technical and commercial project managers. However, the implementation of the commercial manager role has been ambiguous as the role

description has varied from project to project. There has even been ambiguity between roles of commercial and contract managers and these terms have sometimes been mixed in practice.

The case firm has realized that the global launch of the commercial manager role can improve their project execution, and subsequently, their financial success. As a result, further research is required about role execution practices to unambiguously enable the global implementation. In order to do this, the case firm needs to develop an understanding about basic principles of the role in theory, how it is already implemented in their business, and how it has affected the project execution and the success of projects. The aim is to find a way to organize contents of commercial management to support the project execution and to develop a universal and well-functioning role description based on existing project execution experiences.

1.2 Theoretical importance

There are multiple types of projects, such as research, construction, IT, and management projects. In project-based business, projects are sold and implemented to customers, project delivery being the core business process of the company. Hence, commercial aspects and decisions have a major impact on the success of projects. In the 90s, organizations started to realize that all but the most trivial projects cannot be effectively completed without well-designed contracts between different project parties. Commercial considerations became an essential part of a successful project implementation and integrated tightly into project management (Turner, 1995).

Increasingly, projects are used by commercial organizations as tools helping to address their corporate mission, objectives, and goals. Commercial issues, and therefore commercial management, has an integral role in this due to the fundamental feature of any commercial organization: key objective is to generate profit (Lowe and Leiringer, 2006). Being part of an external context, projects are constrained by its environment, for example resources of a parent organization (Turner, 1995). Especially, financial constraints are usually present in the project implementation. Traditionally, project management is seen as getting things done, but if projects do not make profit, the business is not worthwhile. Henceforth, knowledge in commercial management is a key

factor in project management to be aware of financial constraints and contractual and commercial risks that exist in the project context (Chen and Partington, 2006).

Sales projects seldom occur in a vacuum but rather involve parties representing several functions of the organization. A non-routine nature of these projects requires goods, services, and work to be acquired from outside of company's internal business. Hence, commercial, financial, and legal considerations are needed to manage the cooperation with external parties. These commercial relationships with both the customer and suppliers constitute the basis of commercial management of projects (Turner, 1995; Lowe, 2013; Winch, 2014). Especially, project's customer, owner, and contractors are key commercial partners (Winch, 2014).

Terms "Commercial Manager" and "Commercial Management" have been used in an industrial context at least from the middle of the twentieth century. Later, the extent of these concepts has seen a significant increase during the last few decades. Still, the use of terms is not unambiguous between different fields of industry. For example, a quantity surveyor or a contract manager are examples of roles that have seen their own evolution into a broader concept: a commercial manager. As a result, a wide spectrum of project-based organizations acknowledge commercial management and utilize commercial managers in their project implementation, whether or not they call them explicitly commercial managers (Lowe and Leiringer, 2005).

Even though commercial management has been widely recognized through different fields of industry, there is no comprehensive understanding how to define it. Researchers have failed to show a consensus over defining what commercial management is and what a commercial manager does (Lowe, Fenn and Robers, 1997; Lowe and Leiringer, 2005). This is because a wide range of tasks and skills associated with a commercial manager has emerged in different industries. Usually, commercial parts of projects are seen to include business case, financial management, procurement, marketing and sales, and a legal awareness (Morris, 2001). In other words, commercial management is the part of project management involving mostly in a valuation of work, contract and change management, financial accounting, sub-contractor administration, and teamwork and partnering (Walker and Wilkie, 2002).

The diversity of definitions is surprising as commercial management as a term should be ambiguous. In *The Oxford Modern English Dictionary*, commercial is defined as “... of, engaged in, or concerned with commerce; having profit as a primary aim rather than artistic, etc.” and management as “... the process or an instance of managing or being managed”. By combining these definitions, commercial management can be defined as “*The process of controlling or administering the financial transactions of an organization with the primary aim of making a profit*” (Lowe and Leiringer, 2005). This definition can be broadened to concern also projects instead of organizations.

Even though these views of commercial management highlight different aspects, they all consist similar key characteristics. Commercial management is more involved in managing external operations than internal project execution phases, including both upstream and downstream in the supply chain. In addition, the financial aspect is in a major role in these definitions as commercial management is seen to be responsible for the financial success. As a result, the aim of commercial management is to affect and manage the scope, schedule, and cost of the project to maximize the project profitability.

As stated, there is an obvious connection between the financial success of projects and commercial management. Hence, it is hard to understand why there is such a little number of references to commercial management in the literature. The ultimate goal of organizations is to make profit and to generate shareholder and stakeholder value. Still, in the project management literature, commercial management is suffering from a little attention. Related management areas and activities are digested for different project management areas and roles rather than discussed as a major entity with a holistic approach.

1.3 Research questions

The need within the case firm provides a unique possibility to study the little researched topic of commercial management, and more specifically the commercial manager role. As such a holistic concept, commercial management needs be researched empirically to be able to provide new knowledge both theoretically and practically. Commercial management can most effectively be studied through the commercial manager role, due

to the strongly holistic appearance. New knowledge is provided through the case firm's project execution practices to fulfill the existing research gap in both organizing commercial management in projects and evaluating performance implications of the existence of commercial manager.

As the objective of the research is two-dimensional, the research has two separate research questions. Firstly, it is studied how commercial management activities can be effectively organized to support project execution, with or without the commercial manager. Secondly, it is evaluated whether the commercial manager has a positive effect on project execution and the success of those. As a result, research questions of this thesis are stated as the following:

1. *How can commercial management activities be effectively organized to support project execution?*
2. *How the commercial manager role affects the success of projects?*

Through addressing the first research question, the thesis provides an understanding how to organize commercial management activities and what is the role of the commercial manager in that. The most important aspect is to accumulate knowledge on how the work needs to be split between different manager roles within projects. Especially, project managers, commercial managers, and project controllers must have clear definitions of responsibilities. As a result, the case firm will obtain an understanding about the role description for commercial manager to support their global implementation of the role. Academically, more insights and evidence will be created about organizing commercial management activities and appointing the commercial manager role in projects in this specific metallurgical plant delivery context.

The second research question focuses on the success of projects where the commercial manager role has been applied. Through understanding whether the role has benefitted the project execution in already conducted projects, the role definition can be improved. Beneficial practices can be highlighted and developed, and conversely, those that caused disadvantages or ambiguity can be reorganized. In addition, knowledge is provided in which projects the role implementation is favored. For example, whether

the size, delivery type, country, or type of the technology correlates with the feasibility of implementing the commercial manager role. For the theoretical context, knowledge is provided on how the existence of commercial manager is expected to affect key commercial performance indicators in real-life project execution context and further what these key commercial performance indicators are.

1.4 Research method

The thesis aims to provide new knowledge for both the case firm and the academic society. It is an empirical research describing, analyzing, and developing commercial management in projects. The study is descriptive in its nature. The rather extensive literature review of the study provides the theoretical background to which empirical findings of the research contribute. Mostly project management literature is revised to introduce concepts and frameworks connected to commercial management. The phenomenon is then empirically studied by analyzing projects in the case firm. The unit of analysis of the thesis is a project.

In the empirical part, both qualitative and quantitative methods are combined to understand commercial management comprehensively. It was discovered that either a statistical analysis or a qualitative case study alone cannot address both research questions extensively. Hence, the thesis is performed through mixed-method approach utilizing both primary and secondary data to comprehend each other and to increase the validity of results. Due to the limited project sample, the quantitative part of the research is exploratory aiming to find potential relations between variables rather to confirm specific hypotheses. The phenomenon is studied through the cross-sectional method.

The study focuses on the case firm and their project execution habits. Therefore, the context of the study is projects in project-based business in the industry of mining and metallurgical technology, specifically, metal and mineral processing machinery and plants. In this context, only major projects are observed since the complexity of major projects create a greater need for effectively organized commercial management activities. Finally, the study concentrates on projects implemented during the last decade to ensure comparable project implementation practices, level of technologies used, and the quality and the form of the data.

1.5 Structure of the thesis

The structure of the thesis follows mostly a common IMRaD logic. IMRaD stands for Introduction, Methods, Results, and Discussion. However, because of the importance of the included literature review, the theoretical background is given its own chapter after the introduction. As a result, the thesis is divided into five chapters each of which serving its own purpose.

The first chapter of the study presents the background of the thesis, on behalf of both the case firm and the academic society. In the second chapter, the literature is reviewed more thoroughly. Chapter 2 is divided into four main themes that are reviewed from the perspective of commercial management. It begins by introducing a project in project-based business, continues with presenting commercial management as a part of project management, goes through the success of projects, especially the commercial part of it, into the commercial manager role. Chapter 3 introduces in more detail the methodology of the empirical study, including research methods, data collection, and analysis methods. In Chapter 4, results of the empirical study are presented relating to the case projects' execution from a commercial perspective, to the way to organize commercial management activities, with or without a commercial manager, and lastly, to the relation of the existence of a commercial manager and the success of projects. Finally, Chapter 5 concludes the thesis and discusses results and their importance in both practical and theoretical contexts.

2 Theoretical Background

Chapter 2 reviews prior research and summarizes their main findings on commercial management. It presents the theoretical background and the conceptual frame to which empirical findings will later contribute. Firstly, projects and their key structure in project-based business is introduced. Secondly, commercial management and its connected management areas are presented in the context of managing customer projects in project-based business. Thirdly, the success of projects is outlined with the main interest in evaluating the most relevant metrics and criteria for commercial side of customer projects. Finally, the commercial manager role is reviewed more comprehensively to identify performed commercial activities and responsibilities in project execution.

2.1 Projects in project-based business

To deliver complex requirements, projects have become the major method across industries (Morris and Pinto, 2004). Projects are fundamentally linked to a high degree of uncertainty due to their complexity and uniqueness. This provides a motivation for companies to contractually pass the risk to a specialist provider, for example a construction contractor, if they do not own competitive knowledge and practices themselves (Winch, 2002). The project execution structure and life cycle view of project introduce project in project-based business.

Project execution structure

The motivation to utilize specialist providers in project execution forms the basis for the most common market structure for the construction industry, which is presented in Figure 1 (Smyth, 2006). The market structure in construction consists of three players forming the context for the project: the client, the contractor, and suppliers (PMI, 2004). The client is the party that has the need for the solution, thus providing the opportunity for the project to emerge. Constructing and engineering seldom are core competences of the client organization and therefore they outsource project execution for a party focusing on those activities. The contractor is the party from which the client procures

the project. In other words, the contractor is the administrator and organizer of the project. Finally, especially in the modern market, the contractor outsources many minor project areas and packages from multiple suppliers, and even sub-contractors.

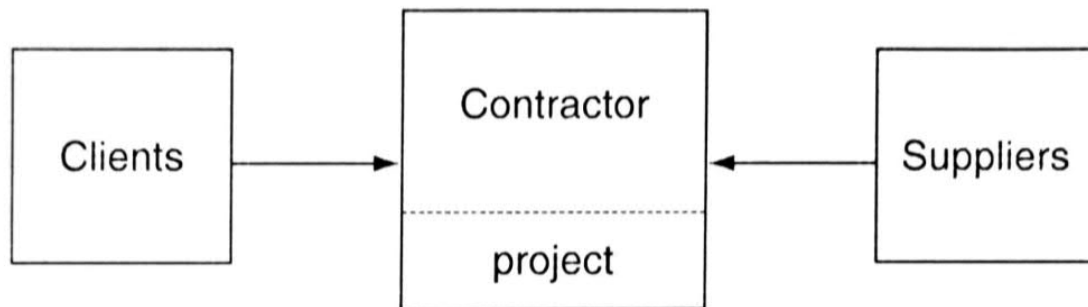


Figure 1: Common client-contractor-supplier structure in construction (Smyth, 2006).

This kind of market structure generates two main conditions for competition (Smyth, 2006). Firstly, the situation where there are multiple parties willing to provide something, project in this context, creates a competition between these parties. In other words, suppliers compete with other suppliers to be the one who captures the opportunity the client is providing. Secondly, a competition arises when more than one party is willing to buy or secure something from another party. As a result, also clients are competing with each other to be able to secure the scarce provision. .

Achieving operational goals and commercial objectives is hindered by the failure to understand the power and the leverage circumstances of industry players. Traditionally, commercial goals of buyers and suppliers contradict with each other as the buyer aims to maximize the value for money and, on the contrary, the supplier attempts to maximize returns from the exchange they are providing. As a result, commercial management about business relationships needs to be analytical, focusing on both sides of the relationship, predictive, and focusing on complex interconnections of commercial and operational preferences of both parties (Cox and Ireland, 2006).

Life cycle view of a project

Not only in goods business, but also in project-based capital goods business, such as major power plant business, a trend towards servitization has shifted the customers' decision-making to be more concentrating on life-cycle benefits and costs than

investment cost (Kujala *et al.*, 2010). Together with globalization, this has changed the primary interest of customers from acquiring an investment project into purchasing performance during its use-phase (Ivory, Thwaites and Vaughan, 2003). As a result, more service intensive business strategy has emerged widely in project-based produced high-value capital goods business (Oliva and Kallenberg, 2003; Davies and Hobday, 2006).

To answer to the shift in customer expectations, project suppliers need to be able to considerably extend its focus from short-term to life cycle view in their project delivery (Helander and Möller, 2007). In capital goods business, this increases the pressure for project suppliers to decrease operations and maintenance costs of their offered total solutions throughout their life-cycle (Wise and Baumgartner, 1999; Ivory, Thwaites and Vaughan, 2003). As a result, the focus of project contractors shifts more into the use-phase by increasing their involvement, instead of the customer, in operating and maintaining installed equipment or plant (Kujala *et al.*, 2010). This enables the project contractor to capture a larger share of the overall value stream leading to increased profits since their responsibility in customer's business is increased (Davies, 2004).

A comprehensive illustration about project life cycle, focusing on three levels of it, is presented in Figure 2 (Zidane *et al.*, 2016). It is further developed model from ideas presented by Samset (2003). The operational level refers to the traditional project, including the design, construction, and closure of project execution. The tactical level is a broader concept including the need identification and other front-end activities, as well as operations of the project output. Strategic level includes the system, usually the parent company, triggering the project and continues until long-term impacts of the project are existing.

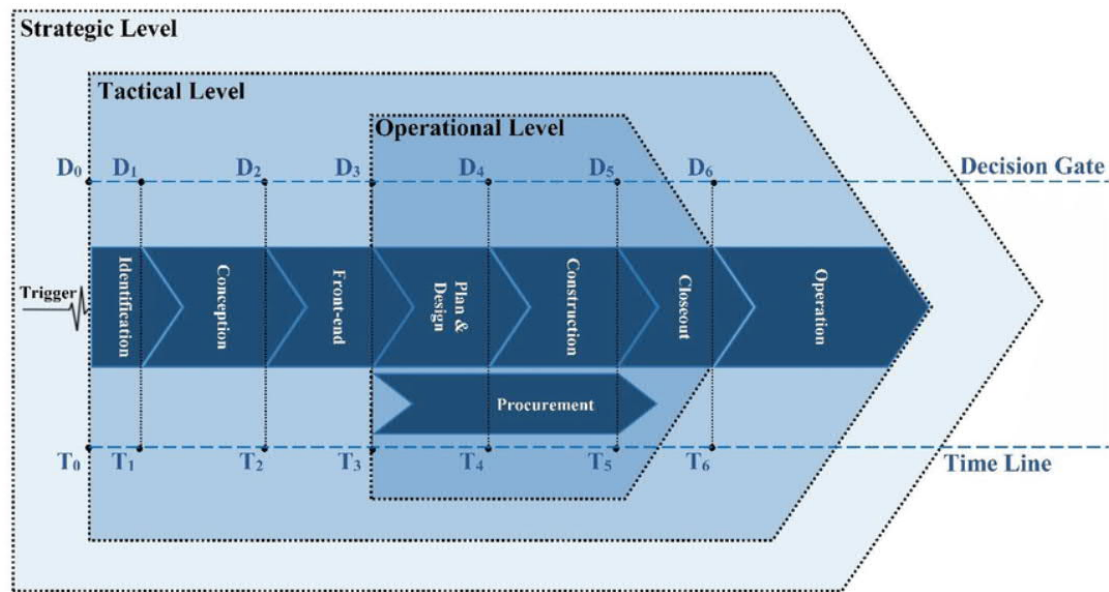


Figure 2: Three levels of project life cycle view (Zidane et al., 2016).

Summary

Specialist project provider is in place in managing business relations with parties from both upstream and downstream of the project structure. Their core competences in engineering and construction need to be exploited by penetrating the increased need of customers to purchase performance rather than just acquiring an investment. Through considering and managing the life cycle of the project, the constructor captures a larger share of the overall value stream leading to increased profits.

2.2 Commercial management in project-based business

Executing construction projects is a common and increasing practice in project-based business for implementing organization's commercial strategy. Commercial management has been a vital function linking project level operations to the organizational core of the company. Therefore, commercial management relates to interfaces between organizations and divisions within these organizations. As a result, commercial management in projects can be defined as: *"The management of contractual and commercial issues relating to projects, from project inception to completion."* (Lowe and Leiringer, 2006). This definition links commercial management more to the project context than the definition introduced earlier in

Chapter 1. To combine the project view from the first, and the profit view from the second, commercial management is defined in this thesis as: *“The management of contractual and commercial issues relating to projects, from project inception to completion, with the primary aim of making a profit”*.

Even though projects exist as stand-alone entities, the decision-making within those usually has connections to the organization involved. In other words, companies in project-based business must solve interrelated issues at both project and corporate level. The balance between short-term project goals and long-term objectives of the company is fundamental to be achieved. This means balancing critical resources and distributing profits and risk between projects and even business units. Commercial management plays a fundamental role in managing these interfaces (Lowe and Leiringer, 2006).

In addition to intercompany interfaces, commercial environment is constrained by complex legal agreements as each party must manage their resources under contracted obligations. The design, award, negotiation, and management of these business-to-business transactions have become primarily responsibility of commercial function of the project (Lowe, 2013). The aim is to achieve a satisfactory commercial outcome for the time and resource investment for the project. This requires tools and techniques to manage information about financial consequences of resource usage. Project value, production outputs, cost profiles, and resource inputs needs to be modelled to achieve commercial success (Lowe, 2006).

Figure 3 presents commercial management practice areas within a project. It describes activities, knowledge, capabilities, and processes that underpin commercial practice. Main management areas are relationship management, risk management, transaction management, and legal, regulatory, and governance related issues. Additionally, negotiations, financial decisions, contract management, bid management, procurement, project management, corporate business role, and business development are functions playing an integral part in commercial management of projects.

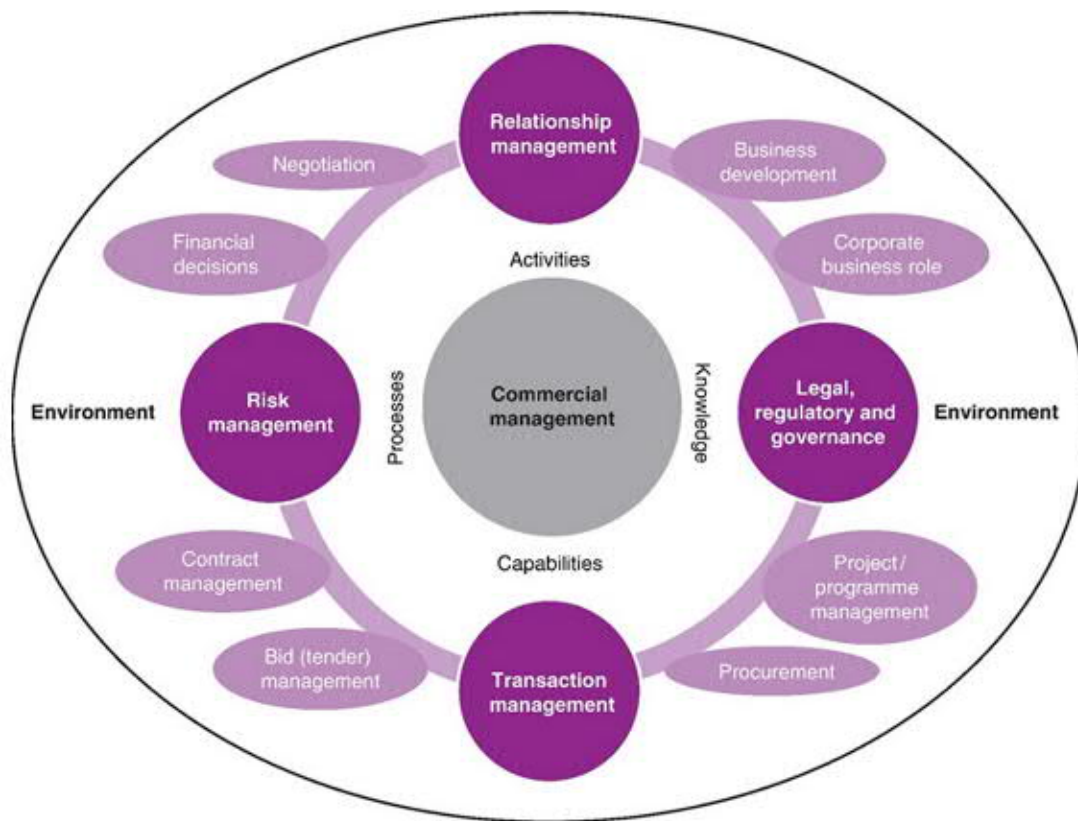


Figure 3: A model of commercial management including related management areas (Lowe, 2013).

Figure 4 introduces similarly commercial management within managing complex projects but concentrates on presenting it in the context of other areas. Here, commercial management is presented as its own discipline in relation to other project management areas: integrated systems & services and project process management. Contract, dispute, bid, and cost management are included completely in commercial management. Instead, procurement strategy and performance measurement are performed in cooperation with other functions. Additionally, the figure highlights the centrality of risk, value, and supply chain management for managing projects.

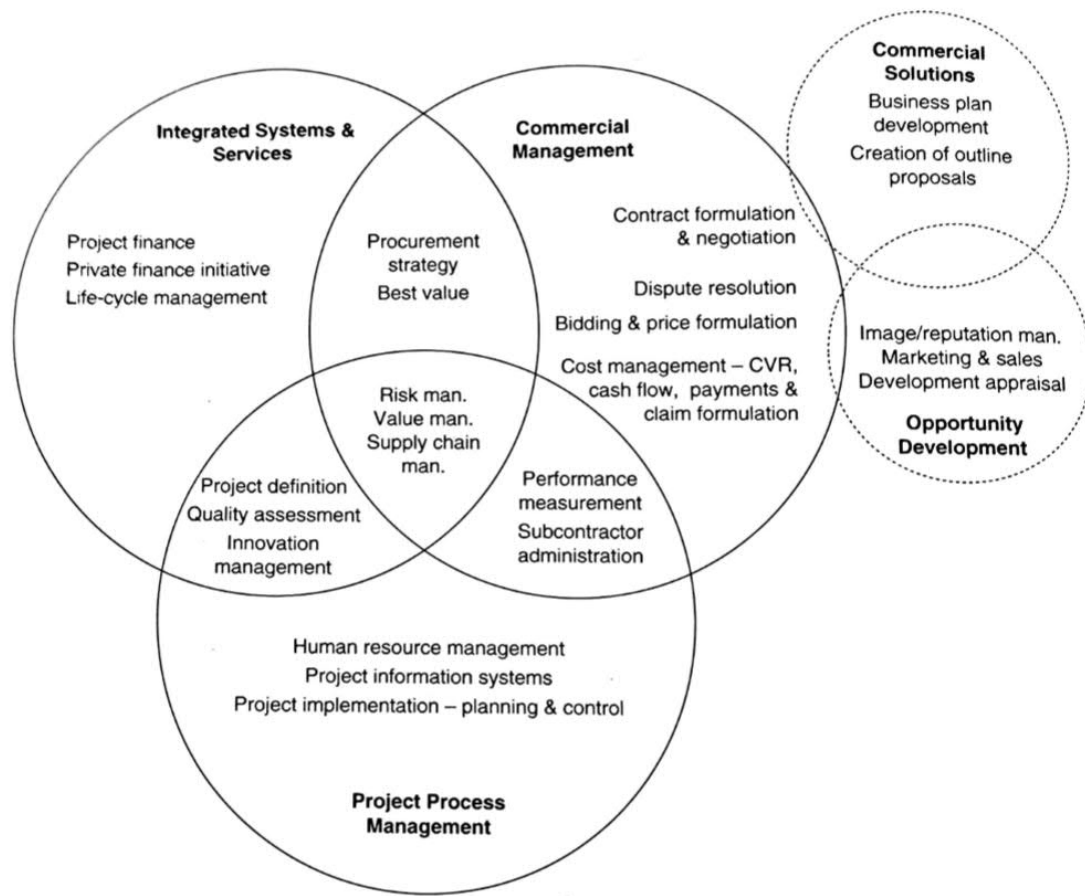


Figure 4: Commercial management and its interfaces with other disciplines in managing complex projects (Lowe and Leiringer, 2006).

Combining these figures, commercial management is constrained in this thesis as a discipline concerning issues relating to the relationship, risk, contract, and financial management of projects. On this matter, it follows that commercial management includes contract and procurement, relationship and communication, risk, change, claim, and cash flow management of projects, as introduced in Figure 5. These six management areas cover at the project-level management of all finances of the project and the contract with the customer and sub-contractors commercially, legally, and technically. Each of those six management areas are next described in more detail to provide a basis of commercial management.



Figure 5: Commercial management and related management areas in this thesis.

Contract management and procurement

To deliver a complex asset in demand, projects require diverse skills and resources to succeed. Hence, projects tend to be subdivided into smaller packages, that can be supplied from competitive suppliers. The higher is the level of subcontracting, the less the contractor is producing themselves. This requires increased management focus on several inputs that subcontractors are providing. Contract management and change control processes are central project procurement management areas, with the aim to administrate contracts and purchase orders of the project (PMI, 2004). As a result, management of costs, especially transaction costs, becomes critical function of project management (Winch, 2002; Langford and Murray, 2006) and procurement has become a fundamental issue for commercial management (Murray and Langford, 2003).

Contracting is an essential part of outsourcing and procuring project parts, and therefore commercial management requires contractual knowledge and management skills. The primary purpose of a contract is to define obligations between the seller and the buyer (PMI, 2004). In addition, recourse to the law if either party fails to perform agreed activities needs to be stated (Hughes, 2006). In other words, contracts act as a glue binding project participants into the mutual project process. When these obligations stated by the contract are completely fulfilled, companies shall not hesitate with the contract closure and perform the handover of all the agreed outputs (PMI, 2004). This stands for both directions: the customer and suppliers.

Optimally, contracts consist of four fundamental elements: a mutual understanding between parties, an ability of parties to choose their terms of business, intentions of all parties to be included in terms of the contract, and that the effect is restricted to parties of the contract by the privity of the contract (Hughes, 2006). In practice, however, contracts are signed under uncertainties and with an assumption that the customer is paying for the work and materials rather than finished equipment (Hughes, 2006).

A current procurement trend within sophisticated companies is to search optimized value rather than minimized priced. In bidding, this means that also commercial and technical criteria matters in addition to financial ones (Lowe and Skitmore, 2006). All parties in the supply chain benefit from this value enhancement. To succeed, it requires deeper relationship and more integration between firms. Therefore, procurement cannot only be considered as transaction-based exchange, but rather more complex and socially relational process concerning value and time in addition to costs (Langford and Murray, 2006). Similarly, customers have begun to involve more actively in major projects. As a result, more comprehensive management than just traditional contract management is required for successful outcome of the project contracting and procurement.

Relationship and communication management

Traditional procurement methods emphasizing rather contractual than trusting relationship have been pointed out as defective strategy (Murray and Langford, 2003). Long-term relationships with external suppliers, and customers, have been considered as a superior strategy of outsourcing when compared to strict and precise contractual

relationships (Brchner, 2006). The importance of trusting relationships expands to commercial management, as trust plays an significant role on commercial manager's ability to link strategic goals to activities of project delivery team (Swan, McDermott and Khalfan, 2006).

An extensive study suggested that trust in construction projects consist of four separate but related factors: relationship, communication, commitment, and reliability (Swan, McDermott and Khalfan, 2006). Relationship refers to individuals' practices to share their values and to treat each other. This defines how the project team has been established and whether the atmosphere is cohesive and positive. The second factor concerns how communications are transmitted defining the mode and the nature of the communication. Essential issues of effective communication that needs to be identified and indicated are honesty, integrity, timeliness, and openness. Thirdly, individuals need to show commitment towards shared values and goals. The commitment starts from the top of the hierarchy but expand to all project levels. Finally, the reliability is required in a trustful relationship being the key element in establishing it.

As the primary interface of commercial management is with external parties, communication plays an integral role in its success. Project information generation, collection, distribution, storage, retrieval, and disposition need to be timely and appropriate (PMI, 2004). Therefore, commercial management focuses on generating effective practices for communicating relevant project information with other parties, both external and internal. Here, characteristics of communication parties needs to be concerned for example in deciding formality and frequency of the communication. Fundamental questions around communication practices include: who needs what information, when they will need it, how it will be given to them, and by whom (PMI, 2004).

Risk management

Uncertainty is a fundamental aspect in project execution due to its uniqueness and complexity. Every circumstance cannot be exactly known beforehand as they occur first time, at least at that specific context. Traditionally, this is considered as risk management of the project. However, risk has had fundamentally negative association

and therefore risk management has mostly been covering negative uncertainties, referred as risks. Instead, positive uncertainties, referred as opportunities, need also to be managed and exploited. As a result, commercial management needs to include both threats of failure and opportunities for success in their decision-making criteria (Kähkönen, 2006).

Project risk management refers to processes that concern with planning, identification, analysis, responses, and monitoring and controlling on project risks (PMI, 2004). Risk management is a dynamic process which is reviewed throughout project execution. The aim is to increase probability and impacts of positive events and, on the contrary, to decrease those on negative events (PMI, 2004; Cooper *et al.*, 2005). In the reality, however, risks usually have multi-dimensional effects and therefore the total effect is not unambiguous. It can be negative and positive at the same time. Therefore, risk management requires intensive focus from commercial management ensuring the commercial success of the project.

It has been acknowledged that people tend to be more risk averse under contractual obligations than during the initial stages of a project when opportunities are in the center of attention (Kähkönen, 2006). More options are usually available before the contract is signed than after it. Therefore, the atmosphere in the project usually changes after the contract is signed since the project team feels that only obligations are left. As a result, early phases of the project are critical in risk assessment to achieve a well-balanced commercial approach to risk, and opportunity, management.

Change management

Traditionally, uncertainty in a project follows an s-curve as presented in the Figure 6. At early stages, there are multiple unclear issues and even issues that the project team do not know that they do not know. For example, uncertainty can be related in the design, technology, regulatory, and suppliers of the project (Winch, 2006). Throughout project execution, uncertainty decreases as more knowledge is gathered. The knowledge gathering is usually at its highest rate at the middle of the project forming the s-shape of the curve.

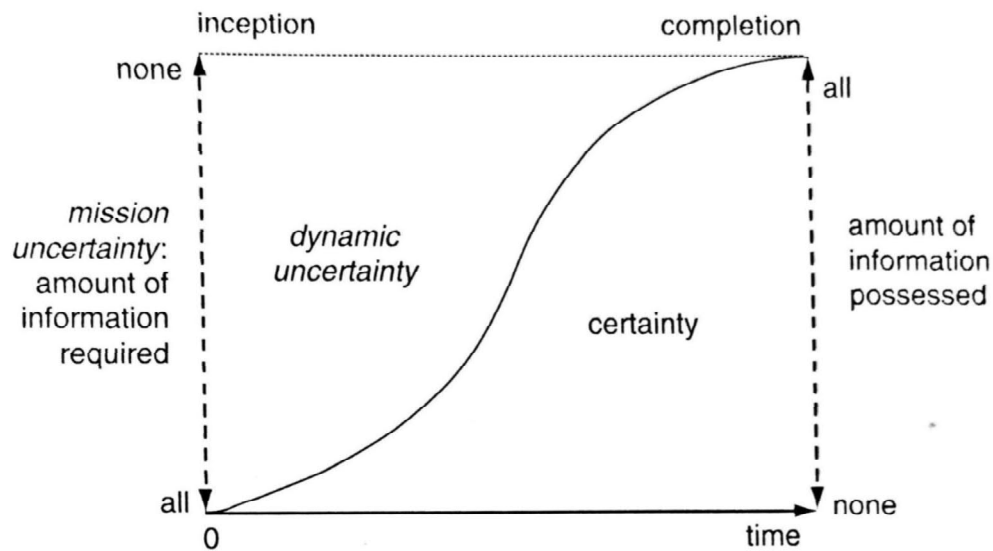


Figure 6: A development of uncertainty in a project from inception to completion (Winch, 2001).

Similarly, costs of changes increase exponentially over time as changes usually requires correcting actions for already designed or conducted parts of projects. At the same time, the ability to influence on project outcome decreases through an s-curve. However, these characteristics, presented in the Figure 7, refer mostly on cases when something is actually changed, and not added to the project scope. Therefore, costs of change orders in case of additional sales do not follow similar exponentially increasing curve.

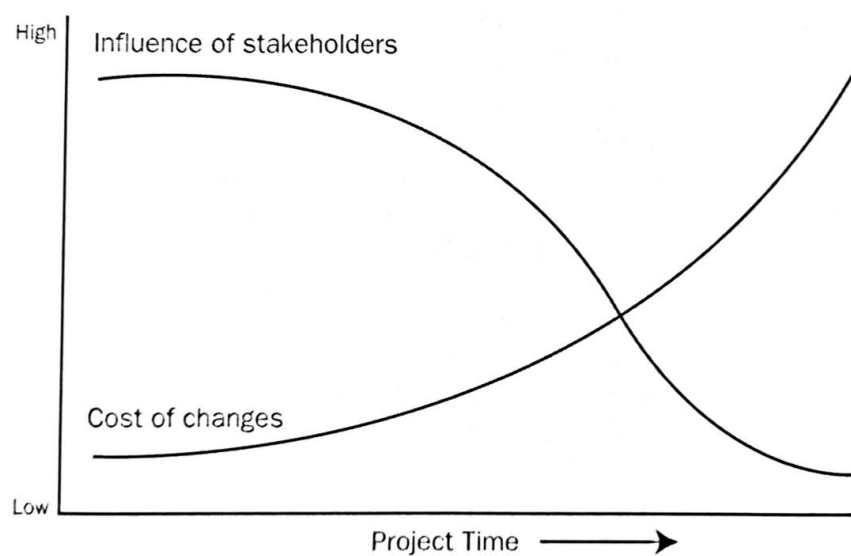


Figure 7: An ability and costs for changes in a project over time (PMI, 2004).

Theoretical Background

From the commercial management point of view, the state of uncertainty plays an integral role in decision-making. As mentioned, early stages are important for decisions for the remaining of the project. At that stage, however, knowledge has not yet been gathered, and every decision is hindered by some uncertainties (PMI, 2004; Samset and Volden, 2016). Therefore, it is difficult to assess the scope, time, and costs of the project with precision. As a result, commercial management needs to acknowledge the state of the knowledge gathered, and similarly the remaining uncertainty, in decision-making. Additionally, the flexibility to comply for changes when more knowledge is gathered, is essential for effective change management.

In all types of construction projects, variations are a common phenomenon (Fisk, 1997; O'Brien, 1998). Any deviation from an agreed, whether it is related to schedule or scope, is considered as variation. A change order is a formal way to modify the contractual agreement between different project stakeholders (Fisk, 1997; O'Brien, 1998). Especially in construction projects, change orders are a necessity even in the most thoughtfully planned projects (O'Brien, 1998). This is a consequence of a long duration, complex relationships among stakeholders, and various uncertainties in the project context (Keane, Sertyesilisik and Ross, 2010).

Change orders are mostly considered as negative phenomenon relating to cost-overruns, delays, or quality losses within the project (Keane, Sertyesilisik and Ross, 2010; Shrestha and Fathi, 2019). However, change orders can also be beneficial for the project contractor and a method for increased profits (Alnuaimi *et al.*, 2010). Change orders can be a result of a scope increase requested by the customer. This may include increased capacity of the plant, additional equipment and spare parts, or more comprehensive service. As a result, change orders can be detrimental, but also a method for capturing more value by the project contractor.

In effective change order management, proper documentation of inputs and outputs is essential. It needs to be defined which kind of changes and actions are requested, and similarly which of those are approved and which are rejected (PMI, 2004). The project plan must be maintained accordingly as changes usually cause the need for revising, for example, the contract value, cost estimates, schedule dates and sequences, resource

requirements. The most vital parts of change management process are the identification of the need or the occurrence of the change and reviewing and approving right change orders and actions for those to penetrate benefits and to minimize threats of changes.

Claim management

In addition to variations, claims emerge in every complex project due to uncertainties. The evaluation of claims is usually prescribed by the contract between project parties defining explicit procedures for the evaluation (Ross and Hugill, 2006). The extent of net realizable value is a common method to estimate the effect of claims and variations. In reality, however, claims and variations are often aggregated at the end of the project with a disagreement about the sum entitled to them (Ross and Hugill, 2006). As a result, active commercial management is beneficial for solving claim and variation issues during the project without more serious conflicts.

There are several reasons to cause claims in a construction industry: differing site conditions, delays, change orders, inspection problems, misinterpretation of specifications and plans, inefficiency and disruption, unfulfilled duties, and unrealistic contract duration and cost (Arditi and Patel, 1989). A resource availability and substitutability, site conditions, and estimations in contract forming constitute essential factors to manage claims and to avoid them to occur at the first place. Additionally, claims might be a result of unsuccessful risk management. The contractor usually bears external risks, such as inflation, labor problems, strikes, adverse weather, and accidents.

Due to the nature of project changes to be inevitable, there might occur conflicts and even disputes between project parties. Disputes are usually a consequence of an imbalance in a risk allocation between project parties (Arditi and Patel, 1989). Disputes can harm substantially the successfulness of the project as they can increase costs, delay the execution, or even make the project unfeasible. Therefore, disputes need to be avoided, or at least resolved as efficiently as possible through managing the problem or negotiating a settlement (Fenn, 2006). Conflict management and dispute resolution are essential for commercial management since its responsibility for relationship and claim management with external parties.

Cash flow management

Cash flow management forms the basis for the financial management of the project. It is considered as one of the major issues in contractor's project execution and can cause inadequate working capital when performed poorly (Cui, Hastak and Halpin, 2010). Cash flow is constituted with planning, controlling, monitoring, and forecasting of payments, cash receipts, and invoicing (PMI, 2004). The importance of timing of invoices and payments are vital since the firm needs to ensure that they have liquidity to perform purchases. In general, the firm wants to receive money as soon as possible and, on the contrary, pay invoices as late as possible. Terms and conditions of the contract are essential for cash flow management due to defining payment terms with the customer, sub-contractors, and suppliers.

Financial factors can significantly impact on project profit and project execution itself, and therefore are one of major consideration of contractors in project business (Liu and Wang, 2008). Cash flow management in high importance in commercial management, due to its strong link with financial management and contractual agreements defining financial terms of the project. The contract and payment terms need to be negotiated to support project execution and to ensure a positive financial state in each project phase.

Summary

Current megatrends in project business, such as globalization, servitization, and collaborative business-to-business exchange, have highlighted the importance of formulation and management of complex interfirm relationships, agreements, and contracts. The communication shall be timely, extensive, and precise between parties enabling collaborative work. The uniqueness of projects is the fundamental reason for inevitable uncertainties, leading to increased need of focus on risk, change, and claim management, where also opportunities need to be recognized. The dynamic state of the project amplifies the need for communication and collaboration between project parties. Changes in project execution must be mitigated accordingly, designed to meet project requirements, and agreed with the related party, for example the client, to achieve mutual targets. Financially, the contract must define payment terms and conditions in a way to ensure the positive cash flow and the financial state of the project.

To summarize, commercial management consists of contract and procurement, relationship and communication, risk, change, claim, and cash flow management. To ensure the financial and contractual success, these management areas need to be accordingly managed by integrating effectively needs of key stakeholders to internal needs of the firm. As a result, commercial management is widely involved in different areas of project management, especially in ones interfacing with external project parties but still emphasizing in internal areas like financial and performance management.

2.3 Commercial success of projects

The commercial success of projects is reviewed through three topics. Firstly, the value of the project to its client is introduced, since it is the fundamental factor enabling the entire value chain to exist. Secondly, the success of projects is reviewed from the perspective of the project provider. Finally, more detailed metrics are presented that measures the commercial part of the success in the context of project-based capital goods business, such as plant construction business.

Value for project stakeholders

Usually, the value is considered from the position of the client as their value system is in central role from project inception to completion. Figure 8 illustrates the project relating to the core business of the client. The value for client's investment is obtained when their value criteria are satisfied. Commercial management can be seen as a function to monetize this value from the perspective of the contractor (Kelly, 2006). In the field of construction, the value engineering is commonly considered as a key activity of commercial management (Kelly, 2006). Here, key commercial activities are defining, creating, and delivering value for the client and, on the contrary, identifying, acquiring, and exploiting value with their suppliers (Lowe, 2013).

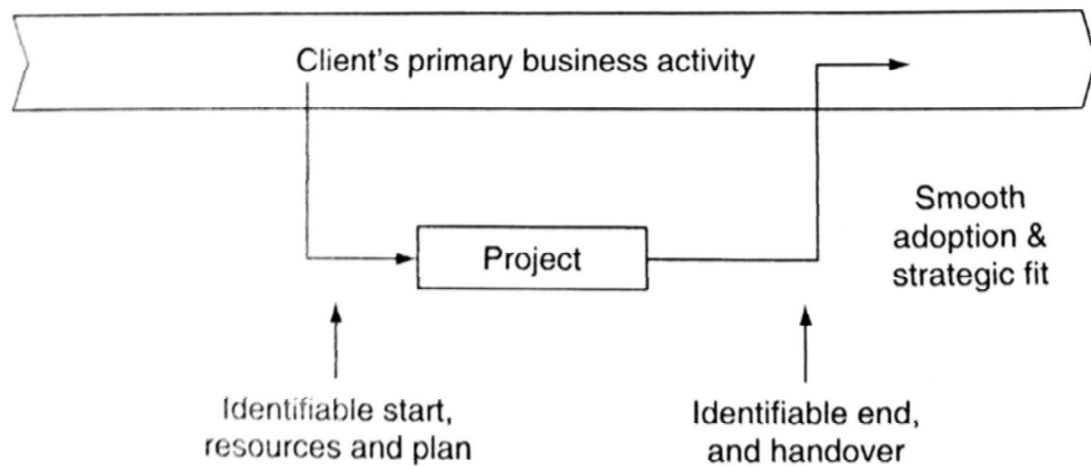


Figure 8: A project in relation to client's core business (Kelly, Male and Graham, 2004).

Commercial management has practically two methods for enhancing the financial performance of the project: either by adjusting project's valuation or enhancing project costs (Ross and Hugill, 2006). The project valuation can be affected by requirements included in the project scope. Used technology, the extent of delivered product, and additional services are main drivers in increased project valuation. Instead, costs can be decreased by a selection and cooperation with subcontractors, effective claim and risk management, and efficient project execution.

Success of a project

Measuring the performance is vital in assessing whether project objectives are met. If something is not measured, it is usually not managed. However, measuring the performance is rather challenging and therefore performance is usually under-measured, especially in complex projects (Tucker 1986). In performance measurement, it needs to be acknowledged for whom the measurement is done, in which project phases it can be done, and which areas of the project need to be measured through which kind of indicators (Horner, 2006).

Traditionally, the success of projects has been measured through three dimensions: time, cost, and quality. These dimensions, presented in Figure 9, form the basis of project success, also called as the project triangle or the iron triangle (Oisen, 1971;

Atkinson, 1999). However, this three-dimensional criterion has received a broad critique by considering project success too narrowly. For example, client satisfaction, functional performance, productivity, safety, and sustainability are not included in the project triangle (Horner, 2006). In other words, the project triangle only concerns the success of project management and therefore this tactical performance fails to measure broader effects of the project (Samset, 2013).

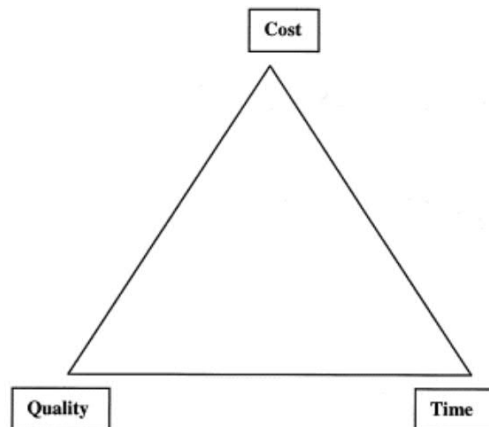


Figure 9: The project triangle (Atkinson 1999).

The wide understanding of limitations of the project triangle has led to emerge of broadened success criteria for project management (Atkinson, 1999; Shenhar and Dvir, 2007; Samset, 2013). All these criteria are formed differently but concern same main aspects of success. In addition to the traditional project triangle, different stakeholders and the longevity of impacts have been highlighted. The most comprehensive criteria were introduced by Shenhar and Dvir (2007) dividing success into five different dimensions based on to whom and when the success is perceived.

The success of projects, introduced in Figure 10, can be measured through five dimensions: efficiency, impact on customer, impact on team, business and direct success, and preparation for future (Shenhar and Dvir, 2007). The efficiency concerns the success of project implementation and therefore follows principles of the project triangle. Impact on customer includes the fulfillment of specifications, the customer satisfaction, and the extensiveness of the use of the product or service. A positive atmosphere created during the project and skills developed during the execution phase are considered as the impact on project team itself. The business success of the project

is measured on how sales, profit, and cash flows are generated because of the project. Created new technological knowhow, infrastructure, or process development are considered as a preparation for future.

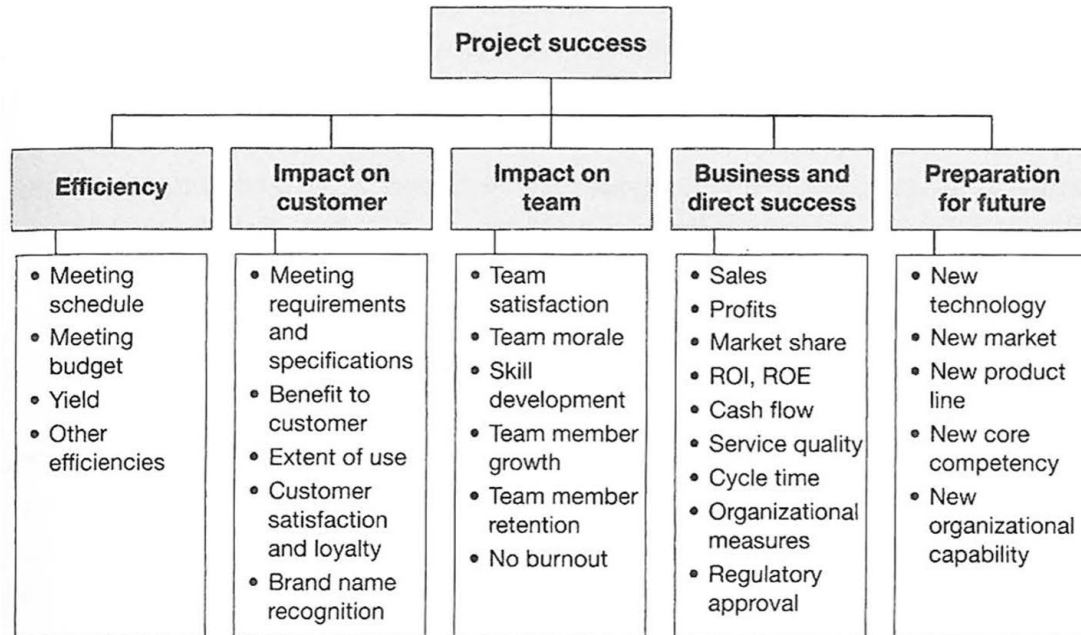


Figure 10: The five-dimensional project success framework (Shenhar and Dvir, 2007).

For commercial perspective, the fourth success dimension, business success, is the most relevant one (Shenhar *et al.*, 2001). This concerns whether the project provides sales, profit, and income as expected. Together, these key performance indicators are called as the commercial success of the project. Secondly, the efficiency relates to the success of commercial side of the project. Changes, that are a core activity of commercial management, affect throughout the project triangle: they can either be scope or cost and schedule related (Atkinson, 1999). Scope changes can be a result of when the customer realizes at later project phase more extensively what they desire from the project. As such case, specifications can be changed, or new equipment or services can be sold to the customer. This naturally leads also to cost and schedule changes to the project. Cost and schedule changes can also occur without any changes in the scope of the project if there are delays or other harmful factors increasing project costs.

The project success can be divided into tactic and strategic performance (Samset, 2013). Success in tactical perspective refers to short-term and self-imposed targets, like the project triangle. These are mostly a result of successful project management. Strategic success, instead, covers broader and longer-term performance. It refers to the effect of the project, like commercial effect, to the wider spectrum of stakeholders. Thus, strategic success is more related to the success of commercial management. Even though, the project life cycle model presented by Zidane et al. (2016) is based on these life cycle ideas, they use terms tactic and strategic differently. Tactical success here refers to the operational level of the project, and similarly, strategical success refers to the tactical level of the project.

Performance indicators

In the construction industry, most common performance indicators are presented in Table 1. Indicators are mostly based on the project triangle but additionally concerning client satisfaction, profitability, and safety of the project. These rough indicators describe extensively different aspects of the success of a construction project. However, they present success only at abstract level and do not propose any exact metrics for project performance. They form the basis for performance measurement, but exact indicators need to be designed based on the context that is measured.

Table 1: Key performance indicators in the construction industry (Horner, 2006).

Client satisfaction - product
Client satisfaction - service
Defects
Predictability - cost
Predictability - time
Profitability
Productivity
Safety
Construction cost
Construction time

Theoretical Background

Gransberg et al. (1999) proposed thirteen separate project performance parameters, initially for analyzing partnered projects. These metrics are listed and explained in Table 2. Parameters were developed to show benefits of partnering and to help in decision-making for those projects. Most of these performance parameters are similarly relevant for analyzing the success of commercial management. This is due to partnering having its effects on interfaces with project parties, similarly to commercial management. Thus, parameters concentrate on how effectively project execution has interpreted with key project parties to increase the financial success of the project.

Table 2: Key performance indicators for measuring the financial success of partnering (Gransberg et al., 1999).

Cost Growth	$= \frac{\text{Final Contract Amount} - \text{Original Contract Amount}}{\text{Original Contract Amount}}$	(1)
Average Cost per Change Order	$= \frac{\text{Final Contract Amount} - \text{Original Contract Amount}}{\text{Number of Change Orders}}$	(2)
Average Percent Increase per Change Order	$= \frac{\text{Cost Growth (\%)}}{\text{Number of Change Orders}}$	(3)
Average Total Change Orders per Project	$= \frac{\text{Number of Change Orders}}{\text{Number of Projects}}$	(4)
Time Growth	$= \frac{\text{Days Charged} - (\text{Total Days Allowed} + \text{Additional Days Granted})}{\text{Total Days Allowed} + \text{Additional Days Granted}}$	(5)
Average Percentage of Additional Days Granted	$= \frac{\text{Additional Days Granted}}{\text{Total Days Allowed}}$	(6)
Average Liquidated Damages as Percent of Total Cost	$= \frac{\text{Liquidated Damages Cost}}{\text{Total Contract Cost}}$	(7)
Average Liquidated Damage Days as Percentage of Total Time	$= \frac{\text{Number of Days of Liquidated Damages}}{\text{Total Days Allowed} + \text{Additional Days Granted}}$	(8)
Percentage of Projects with Liquidated Damages	$= \frac{\text{Number of Projects with Liquidated Damages}}{\text{Total Number of Projects}}$	(9)
Percentage of Projects with Deducts	$= \frac{\text{Number of Projects with Deducts}}{\text{Total Number of Projects}}$	(10)
Claims Cost as Percentage of Original Cost	$= \frac{\text{Total Cost of Claims}}{\text{Original Contract Cost}}$	(11)
Dispute Cost as Percentage of Original Cost	$= \frac{\text{Total Cost of Disputes}}{\text{Original Contract Cost}}$	(12)
Award Price	$= \text{Original Contract Price}$	(13)

Proposed project performance parameters are also relevant in the context of the performance measurement of commercial management. However, the nature of commercial management in seeking additional profits from change orders shifts the emphasis to consider more value, sales, and margin development rather than only costs.

Thus, metrics must concentrate more evaluating also benefits than just minimizing cost and schedule effects of change orders.

Summary

To conclude, the commercial success of projects lies in increasing the profitability of the project while maintaining the scope, cost, and schedule within the client's requirements. The value the client is seeking from the project needs to be considered extensively by the project provider to penetrate it accordingly. Adjusting and enhancing project's valuation is a key mechanism from commercial side of the project provider to ensure the financial performance. To achieve this, commercial management aims to effectively manage changes by finding the way to increase the number of beneficial changes while handling compulsory harmful changes and claims in the most efficient way. The scope of the project must not extend without receiving monetary compensation from the work and resources invested.

Commercial success mostly covers the business success of the project, but also has its effect in other success dimensions, such as the project triangle, impacts on both the customer and the internal project team, and preparation for future. Metrics for the commercial success concern how effectively interfaces between key project parties are managed. This refers to how effectively project provider manages to penetrate commercial actions of the project, such as change and claim negotiations. This way, commercial management can increase the financial success of the project but also increase the satisfaction within project stakeholders.

2.4 Commercial manager's role

At its initial phase during middle of the 20th century, commercial managers were found at top management and the responsibility lied in developing company strategies and acquiring new business. However, recent decades have subsequently seen a fundamental change in that. The number of commercial managers has significantly increased, and the role has become more as middle-to-senior management. At the same time, the role has emerged into larger spectrum of industries, especially into project-based business. (Lowe and Leiringer, 2006)

There is a lack of research about the commercial manager role. Research is conducted on more specific roles such as a quantity surveyor and a contract manager. These roles, however, do not fulfill the holistic approach of commercial management and their role is differently focused and extends to management areas that are not essential for commercial management. A quantity surveyor is a very specific role in construction industry, whose key activity is the cost management. Instead, a contract manager is not usually internal project role but rather a role of a support function concentrating only on managing and negotiating contracts. The only extensive research on the commercial manager role was conducted by Lowe and Leiringer (2005) and it is used as a basis for defining performed activities and required competences of the commercial manager.

Activities of commercial manager

Lowe and Leiringer (2005) performed an extensive cross-industrial study about the commercial manager role. A total of 106 commercial managers, fairly evenly distributed in construction, ICT, and defence/aerospace industry, were researched. The aim was to identify commercial management as a distinct discipline. This was approached through investigating the position of commercial managers and their involvement in projects.

About two thirds of commercial managers worked in a matrix organization attending in multiple projects at a time. A little over two thirds considered their role to be internal project role and integrated into the project team. Commercial managers tended to participate mostly in project development and project execution. Commercial managers involved in both pre- and post-contract activities. Usually, the involvement of the commercial manager began at pre- request for proposal or proposal development phase and ended at contract completion. Most of the work of commercial managers occurred in regional offices, but one fourth of commercial managers operated on production site. (Lowe and Leiringer, 2005)

The study suggested 28 activities that were closely related to commercial managers through literature review and performed interviews. Findings about activities of commercial managers are presented in Table 3. The table includes the frequency of involvement levels of each activity. These levels include part of their core job,

Theoretical Background

supportive role, counterbalance to the activity, and little to no contact with the activity. Based on the frequencies of involvement levels, activities were categorized into four categories based on the mode and the median of responses. (Lowe and Leiringer, 2005)

Table 3: Activities of a commercial manager (Lowe and Leiringer, 2005).

	Job	Support	Counterbalance	No contact	Median	Z
Contract formulation	77	15	5	7	Job	7.126*
Contract negotiation	73	19	4	8	Job	0.113
Risk management	64	31	3	8	Job	3.567
Dispute resolution	61	26	3	16	Job	13.697***
Bidding	52	37	6	8	Job	0.072
Price formulation	52	43	3	8	Support	17.493***
Claim formulation	50	27	5	19	Support	31.952***
Payments	50	30	4	20	Support	24.719***
Cash flow management	49	38	3	15	Support	33.488***
Creation of outline proposals	45	39	7	14	Support	18.424***
Cost management	45	39	5	15	Support	29.765***
Cost value reconciliation	44	38	5	16	Support	39.886***
Value management	43	36	5	21	Support	17.662***
Sub-contracting administration	43	33	6	24	Support	24.097***
Procurement strategy	41	27	10	8	Support	6.169*
Acquiring approvals and permits	40	33	6	26	Support	12.022**
Marketing	10	49	11	36	Support	0.364
Supply chain management	22	47	13	23	Support	17.389***
Business plan development	33	46	6	20	Support	9.096*
Sales	18	46	13	27	Support	15.835***
Estimating	20	44	12	18	Support	6.166*
Quality assessment	13	43	12	38	Support	0.156
Development appraisal	23	41	11	29	Support	0.303
Supplier evaluation	17	41	13	34	Support	14.384***
Image/reputation management	27	40	5	30	Support	0.432
Performance measurement	31	37	9	29	Support	6.972*
Innovation management	23	34	15	33	Support	0.135
R&D	2	27	9	64	No contact	7.096*

NB: **Bold** = Mode

Job = This function forms part of my job; Support = I provide support to the function; Counterbalance = I provide a counterbalance to this function; No contact = I have little or no contact with this function

Based on the study, core activities of commercial managers include contract formulation, contract negotiation, risk management, dispute resolution, and bidding. Dispute resolution was significantly less frequent job in ICT sector and, on the contrary, contract formulation was less frequent job in construction sector. Other three activities

did not show significant differences between industry sectors. Same five activities were highlighted in the questionnaire about top 5 day-to-day activities of commercial managers. (Lowe and Leiringer, 2005)

Second category, with the mode of job and the median of support responses, includes mostly activities in financial management and bid management. Most significant activities here were price formulation, claim management, payments, and cash flow management. Price formulation was especially more significant role in defence/aerospace sector. Instead, other three were less highlighted in ICT sector. (Lowe and Leiringer, 2005)

Activities under supplier management, production management, and business development categories received less significance within commercial managers. These activities were mostly considered as supportive, counterbalance, or no contact. This was similarly noticeable in all three industry sectors. Only activity that received median of no contact was R&D. (Lowe and Leiringer, 2005)

In addition to operational activities, it is evident that creating and managing trust is one of key activities of commercial manager. Commercial manager needs to aim for long-term relationships between project parties by creating and managing trust, internally and externally. These long-term relationships increase the future business possibilities with the client, and cohesion of the project team that can be utilized when new project teams are assembled. In addition, commercial manager resolves disputes between project parties and the project success is contributed by the ability of managing conflicts effectively. Commercial manager is at the position to convey values of the organization generating right kind of project culture. (Swan, McDermott and Khalfan, 2006)

Competences of commercial manager

To succeed in commercial management activities, following task-specific competencies, presented in Table 4, have been identified as most important for commercial managers (Lowe, 2008). Unsurprisingly, contract, relationship, and risk related competencies are on high importance. Furthermore, competencies follow strictly previously presented activities of commercial managers. In addition, different

project management skills are acknowledged as secondary competences as commercial managers work closely with project managers in the lead of the project.

Table 4: Activity-based competences required from a commercial manager (Lowe, 2008).

Primary commercial task-specific competencies		Secondary commercial task-specific competencies	
1	Negotiate contracts	8	Manage workloads
2	Analyse and manage risk	9	Manage knowledge
3	Understand business objectives	10	Manage change
4	Contract management	11	Project management
5	Manage relationships	12	Value management
6	Manage conflict	13	Bidding
7	Draft contracts	14	Performance management
		15	Manage documents
		16	Manage supply chains
		17	Develop new business

Summary

To summarize, the commercial manager role is mostly an internal project role involved in both pre- and post-contract activities. The involvement is required in contract management, cash flow management, change management, and subcontractor administration. Commercial manager is seen as a role responsible for ensuring the profitability and proper cash flows of the project. Contract management, risk management, and dispute resolution were suggested as core activities of commercial manager but also financial and bid management related activities had high relevance in the role commercial manager. In addition, commercial manager supports in supplier management, production management, and business development. As a result, commercial manager is at the place to create long-term relationships with key project parties and ensuring that internal project team cohesion is developed and secured. To succeed in these activities, commercial managers were required to have contract, relationship, and risk related competencies but also project management competencies in general.

3 Methodology

Chapter 3 presents the methodology of the study and justifies the selection of approaches. A brief overview about the research process is presented to illustrate how the research developed and how different stages of the research were executed. The following sub-chapters introduce qualitative and quantitative research in more detail. Firstly, the qualitative research is introduced, by presenting the design, the data collection, and methods of analyzing the data. Secondly, the quantitative research is described by introducing the model and variables of it, as well as methods to collect and analyze the data.

3.1 Research process

The research process, presented in Figure 11, was quite straightforward. The study began by defining research questions of the thesis. Secondly, suitable research methods based on research questions were selected. Combining quantitative and qualitative data turned out to be essential for comprehensively addressing both research questions, which lead to the choice of a mixed-methods approach. Research questions emphasized the importance of the qualitative part and therefore qualitative methods were selected as key methods of the study. The aim of the quantitative part is rather to support findings from the qualitative part. Thirdly, an interview with the Head of Commercial Managers and a review of available training materials provided a preliminary understanding of the topic. A brief overview of literature databases was included to provide a perspective on the discussion of the topic and on the extent of the usage of the term in the literature.

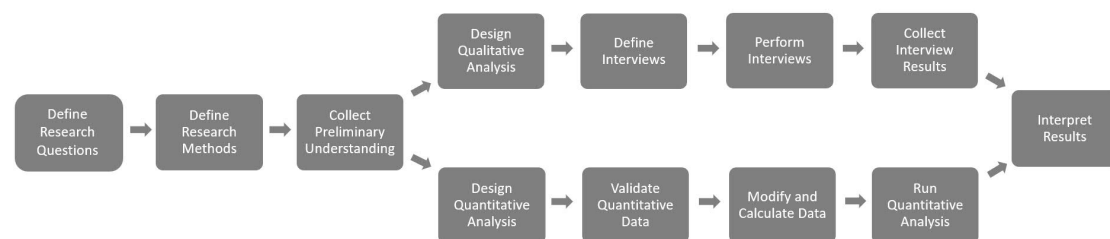


Figure 11: The research process.

The qualitative analysis began by deciding topics and the number of interviews, after which the interviewees were nominated. In the following stage, the questionnaire and two templates for interviews was designed. Templates focused on commercial management areas and activities of commercial manager in accordance with the suggestion of the literature review. The next step was to perform all interviews. Face-to-face and recorded interviews were preferred and therefore a trip was made to Germany. In the analysis phase of the process, recordings of each interview were analyzed, and commercial practices of case projects were compared.

The first step of the quantitative analysis was to decide on the criteria for project selection and to choose key performance indicators. In addition, the model for the quantitative analysis was established with the aim of including relevant control variables to describe dependent variables more extensively. The data was verified by contacting relevant responsible persons to ensure that all budget versions had been updated accordingly. The verified data was exported from the Enterprise Resource Planning (ERP) system and modified to represent relevant figures for the study. A regression analysis was run for each selected performance indicator and a further discussion about the significance and the reliability of results was presented.

The final step of the research process was to interpret results in a broader context. In the interpretation part both academic and managerial implications of the study were discussed. The discussion brought to the fore new knowledge produced by the study from the perspective of the case firm, on the one hand, and from the perspective of the academic community on the other. Also, the contribution of the study to previous findings and to the existing body of knowledge was discussed in the interpretation part. Furthermore, major limitations of the study and possible biases in findings of it were discussed and topics for further research were suggested.

3.2 Qualitative research

For the qualitative part of the research, five case projects with an appointed commercial manager were chosen from the Germany unit of the case firm to be further studied with interviews. To comprehensively understand the commercial execution of these case projects, both commercial managers and project managers of each project were

interviewed. Interviewing two persons also reduced the bias that is constituted by opinions, beliefs, and varying adequacy of the recollections of individuals. As a result, each project description is combined from two separate perspectives. Additionally, three reference projects without a commercial manager were included as a contrast class to expose how commercial management activities has been organized without a commercial manager role. Finally, expectations from the line managers about the commercial manager role were collected from five representatives with a template also used during interviews. The qualitative data of the research is described in Table 5.

Table 5: The qualitative data of the research.

	Case Projects	Reference Projects	Line Managers*
Number of projects	5	3	-
Total number of interviewees	10	3	5

*Line managers only filled in a template relating to expected activities of commercial manager

Several factors were considered in the selection of projects included in the qualitative analysis. Only projects that had representative managers working during the study for the case firm could be included. Projects where managers changed during the project were included if new managers had enough participation in project execution for sufficient knowledge about the project. Secondly, the diversity of selected projects was taken into consideration to represent the project portfolio of the case firm as extensively as possible. This meant that projects were selected from different business lines with a diverse set of clients and market areas and with varied contract types. Methodological choice to select projects with different project personnel minimized the individual bias. As a result, the selection was made in a way only one commercial manager was the interviewee of two projects. Selected case and reference projects, as well as interviewed roles in those and their key characteristics are summarized in Table 6. Project names of case projects were encoded with numbers from 1 to 5, and business lines were encoded with letters from A to E.

Table 6: Case and reference projects, interviewed roles in those, and key characteristics of projects.

	Case Project 1		Case Project 2		Case Project 3		Case Project 4		Case Project 5		Reference Project 1	Reference Project 2	Reference Project 3
Interviewee	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5	Interviewee 6	Interviewee 7	Interviewee 8	Interviewee 9	Interviewee 10	Interviewee 11	Interviewee 12	Interviewee 13
Role of interviewee	Project Manager	Commercial Manager	Project Manager	Commercial Manager	Project Manager	Commercial Manager	Project Manager	Commercial Manager	Project Manager	Commercial Manager	Project Manager	Project Manager	Project Manager
Location of interview	Finland	Finland	Germany	Germany	Germany	Germany	Germany	Germany	Finland	Germany	Remotely	Remotely	Remotely
Delivery unit	Andes / Germany		Germany		Germany		Germany		Germany		Finland	Finland	Finland
Business line	B		D		B		B		C		Other	E	E
Country of the client	Chile		Turkey		Russia		Morocco		UAE		Turkey	Finland	Norway
Contract type	EPS		EPC		EPS		EPC		EPC		EPS	EPS	EQP

Case projects represented all three business lines where commercial manager role has been applied, which were business lines B, C, and D. Thus, business lines A and E were not covered. Each project had its client from different country. Contract types varied from EPS (Engineering-Procurement-Services) to EPC (Engineering-Procurement-Construction). Reference projects, instead, represented business line E and other business line from the other business unit of the case firm. They also contained varied countries of client and contract types included EQP (bundled equipment delivery) and EPS projects.

Interviews were conducted through a semi-structured strategy. An extensive set of questions was prepared beforehand, and themes of those were sent to interviewees to bring back their memories about project events long time ago. The interview questionnaire is presented in Appendix I. Interviews focused on how different commercial management areas defined in the literature, and presented in Figure 5, were organized in case projects, how the commercial manager participated in those, and how projects have developed, especially commercially. During interviews, relevant and interesting topics for the study arose, for which the semi-structured method enabled to focus on more deeply

During interviews of case projects, two templates were filled in to collect also quantitative data about organizing commercial management and activities of commercial manager in case projects. Templates are introduced in Appendixes II and III, respectively. The first template focused on key project roles, which were project,

commercial, engineering, and procurement manager, project controller, and scheduler, participating in those same commercial management areas. Each interviewee filled in his/her opinion about these six key roles and their involvement in those management areas with the scale given from 0 to 2. The aim was to show how extensively each role contributed to each management area. The second template was about the description of activities of commercial manager based on the literature. Interviewees filled in each activity with corresponding involvement level of commercial manager with the scale given from 0 to 3. To find out whether expectations for the role meet the actual performance, also five representatives of line management functions were asked to fill in the second template. This version of the template was modified to include activities that was additionally proposed by commercial managers and project managers.

Face-to-face interviews were preferred to create a more open and natural atmosphere for fluent discussion about projects. Seven out of ten interviews of case projects were conducted in Germany and the remaining three in Finland. Interviews for reference projects in Finland were also planned to be performed face-to-face but were forced to be arranged remotely because of restrictions of COVID-19 pandemic. All interviews except one were recorded with the approval of the interviewee to enable the ability to review contents of the interview afterwards. Two hours were reserved for interviews with commercial managers of case projects, and one and a half hours were reserved for interviews with project managers of both case and reference projects.

The qualitative data was analyzed by compiling answers from project and commercial managers into one coherent project description about how projects developed commercially and how commercial activities were organized within those. Furthermore, project descriptions and the quantitative data from both templates were interpreted to show similarities and differences between case projects and between respondent roles. Especially, the focus was on how differences affect project execution and which strategy was found as the most suitable one. Based on differences and similarities, conclusions and propositions for actions to develop and unify the commercial manager role was presented. In addition, a set of metrics to track the commercial success of projects were developed based on qualitative findings from interviews on influence of an appointed commercial manager.

3.3 Quantitative research

Another aspect of the research was the quantitative analysis of the success of projects with commercial manager. The aim was to compare projects in different business lines and in different delivery units. However, the data was not sufficient for a proper quantitative analysis with significant results since the final sample size consisted only of 42 projects. As a result, the quantitative part aims to introduce a model for evaluating the relation of usage of commercial manager and success of projects. Results from the selected model are presented and the validity is critically reviewed. Variables selected in the model are presented in Table 7.

Table 7: Variables of the quantitative model.

	Independent Variable	Control Variables					Dependent Variables		
Variable	Existence of Commercial Manager	Business Line	Delivery Unit	Starting Year	Contract Type	Contract Value	Amount of Change Orders	Profitability of Change Orders	Margin Development
Value	Two-item dummy	Two-item dummy for each option	Two-item dummy for each option	Ratio-scale	Three-item dummy	Ratio-scale	Percentage of Contract Value	in Euros	in Euros

The existence of a commercial manager was independent variable of the quantitative study. It was presented by a two-item dummy variable, in other words, whether there has or has not been a commercial manager. A multi-level dummy was considered based on the involvement level, for example, none, low, medium, and high, of the commercial manager. Since the role was a full-time job in these major projects, there would have not been any significant differences with involvement levels and therefore multi-level dummy was not used. A multi-level dummy can be used later in a similar study when the role has also been utilized more frequently in minor projects also with varied involvements.

Control variables included the business line, the delivery unit, the starting year, the contract type, and the contract value. The business line and the delivery unit were presented with a two-item dummy for each option. The starting year was presented and modified to be a ratio scale of measurement, as the earliest year (2007) was presented as 0 and each year increased the value by 1. The contract value represented the current

forecasted contract value fulfilling requirements of a ratio scale of measurement. All projects were not fully completed and therefore the forecasted value was used. The contract type was used to control the complexity of projects and it was presented with a three-item dummy where EQP, EPS, and EPC were considered as 1, 2, and 3, respectively, due to increased complexity. The risk category was also considered but due to the lack of data it had to be left out from the analysis, but its significance was recognized for future research possibilities.

Dependent variables consisted of financial metrics of the project. Especially, variables have been designed to describe the successfulness of the commercial part of the project as adequately as possible. The first dependent variable was the amount of change orders made in the project. This described how many additional sales have been achieved to increase the contract value of the project. It is calculated by the difference with the current forecasted contract value and the original contract value from the sales phase. The second variable was the profitability of these change orders as even though the contract value can be increased, if costs increase proportionally, it is not profitable for the company. Finally, the margin development, calculated similarly from the difference between the forecasted budget and the original one, illustrated how project execution has succeeded in general.

The total of 53 projects fulfilled the initial criteria for quantitative data. The first selection criterion was that contract values exceeded 15 M€ since the role has been introduced only in major projects. The exact value derived from the fact that the 15 M€ is also used as a cutoff value in the obligation to report to the board on schedules and resource allocations made by schedulers. Therefore, it has been planned to start the allocation of commercial manager resource with the same criterion. The second criterion was to include projects which have a completion rate higher than 90 %. This ensured that each project has had time to contribute change orders and other commercial development. The 100 % completion rate was not required since many projects were practically completed hanging in ongoing warranty phase. Thirdly, only projects in one of the case firm's business units were included as the role is going to be implemented, at least first, only in that business unit.

The quantitative data was collected from the already available project portfolio report. However, the quality of the data was not sufficient. For example, different budget versions, such as original, revised, and forecasted budget, were not always correctly marked or updated thus needing a verifying process. Consequently, all projects had to be checked for the correctness of the data. For projects with lacking or incorrect data, a more thorough verification was required. After the verification process, there were still nine projects missing some relevant data and therefore those projects had to be excluded from the study. In addition, there were many projects that showed minor inconsistencies through different budget versions but were included in the study as these inconsistencies had a very minor influence on selected metrics. This might skew results a bit and is recognized as a limitation for the study but was necessary for achieving a sufficient project sample. As a result, 42 projects met the selection criteria and contained sufficient information to be included in the study, forming the sample size of the quantitative research.

The quantitative analysis was performed with a regression model where coefficients were found for each variable. Firstly, a variance inflation factor analysis was made to identify all multicollinearity issues within the dataset, especially between the independent variable and any control variables. For variables business line and delivery unit, one dummy variable for each, which were BL E and Other, were removed to avoid a perfect multicollinearity. After coefficients were defined, their significance was compared with a 5 % confidence level to show whether further conclusions could be drawn from results. Due to low significance levels, additional comparison was made based on average values in each dummy variable to further analyze relative impacts on selected metrics. However, issues with small sample size also affects this analysis. The analysis aimed to show issues, for example, with a self-selection bias that occurred with the usage of commercial manager. Commercial managers have been rather appointed to specific kinds of project, like more complex ones, than randomly independently about other project characteristics.

4 Results

Chapter 4 presents results from the empirical research of the thesis. Firstly, each project description, combined from interviews of project manager and commercial manager, is introduced concentrating on how the project developed commercially. The focus is on all arisen commercial issues and their impact on commercial management of the project. Secondly, ways of organizing commercial management areas within key project roles in case projects are introduced and compared. Thirdly, project descriptions about the commercial manager role in each case project are provided. Fourthly, activities of commercial managers and level of involvement in those is reviewed from perspectives of commercial managers, project managers, and line managers. Fifthly, the way to organize commercial activities in reference projects without commercial manager is presented. Finally, performance implications from the quantitative analysis are presented about financial effects of the commercial manager role.

4.1 Execution of case projects from commercial perspective

Five projects were selected to be researched about organizing commercial activities and commercial manager's contribution to the project. Projects were chosen to have distinctive characteristics to represent project population of the case firm as extensively as possible. Table 8 presents projects and their key parameters. The country of the client, business line, contract type, original contract value from the sales phase, change in the contract value, and margin change in percentage are presented for each project.

Projects were executed in different countries, they represent three business lines, and contract types vary from EPS to EPC. Contract values were in both sides of 100 M€. Only Project 1 managed to increase the contract value significantly during the project execution with additional sales and changes. Projects 1, and 3 managed to increase their margin during the project, Project 3 significantly. Instead, margins dropped in Project 2, 4, and 5 alarmingly. As a result, two of five projects, Project 1 and 3, managed to keep a reasonable margin percentage and therefore can be judged commercially successful.

Table 8: Selected case projects and their key parameters.

	Country	Business Line	Contract Type	Contract Value Original	Contract Value Change	Margin Change
Project 1	Chile	B	EPS	66,5 M€	+ 48,6 M€	+ 19 %
Project 2	Turkey	D	EPC	65,0 M€	- 3,7 M€	- 91 %
Project 3	Russia	B	EPS	157,1 M€	+ 1,6 M€	+ 63 %
Project 4	Morocco	B	EPC	80,0 M€	- 0,7 M€	- 56 %
Project 5	UAE	C	EPC	92,4 M€	+ 4,3 M€	- 48 %

Project 1

Project 1 was multilocal implemented in Chile. The original contract value was 66,5 M€. The core project management team operated in Chile, and engineering and procurement were partly performed from German, Finland, and Sweden offices. Each location had own scope for procurement, which they managed by themselves. The contract type was an EPS with a scope to revamp an existing plant of the client. The original schedule was 47 months, with an additional 4-month buffer. However, due to multiple delays, a minor part of the project was still ongoing and envisaged to be finished two and a half year late. Even though the project was significantly late, the case firm managed to achieve a creditable margin and considers the project financial success. The contract value increased by 49 M€ (75 %) from the original budget and the margin increased by 19%. The key success factor has been effective commercial management, especially change and claim management. Major part of delays was successfully claimed to the client and the case firm has been able to turn them into profitable change orders approved by the client.

There were multiple issues causing delays in the project that the client took related responsibility agreeing to pay the case firm for extended work and materials. Firstly, the client rushed to the commissioning phase even though the case firm advised otherwise. This damaged many parts of the plant causing repair and replacement activities. Additionally, several delays were obtained in the client's obligations. The client did not approve an equipment purchase on time causing delays in the case firm's engineering, client started construction later than scheduled and progressed slower than planned, and a disagreement with a subcontractor about change orders caused them to leave site.

Results

A total of 194 change orders were requested from which 170 were approved leading to a very high success rate of 88 %. This included all time extensions, additional equipment and site services, engineering and admin services, extensions of guarantees, financial adjustments, and additional storage. The case firm was not required to pay any liquidated damages to the client. Most of changes were initiated by the client as they wanted contract extensions or modifications, but the project team also recognized issues that caused additional costs and proposed change orders about those. Even though there were disagreements on many issues, the case firm and the client managed to agree always in the project level, without an external interference, by commercial activities like negotiating and reverse claiming.

Risk management was performed through a standard risk management template comprising identified probabilities and severities of different risks and a related mitigation plan to lower the rating. It was prepared by the core project team: project manager, commercial manager, engineering manager, and procurement manager. The risk assessment was followed-up quarterly to ensure that potential risks meet the risk provision level of the project. The project team was mostly scared of a financial risk that the client would not pay and that they fail with claiming.

Change and claim management were a major part of commercial activities in the project. Otherwise, there were no significant actions required with taxes as they were simple VAT based in Chile. In addition, there were no import duties for most countries and, if there was any, they were handled by the client. Similarly, insurances did not require extensive work throughout the project due to the EPS contract. Instead, as the contract with the client was in a local currency and purchases were done in multiple currencies, some work with currency hedging was required. As a result, just a few project specific commercial procedures needed to be created. The most significant one was relating to the change and claim management process. Otherwise, mostly standard procedures were utilized.

The case firm had multiple commercial lessons learned from the project. Firstly, in such a multilocation project, opinions about achievements in the project should have been better unified to support mutual targets. In such a big project, the core project team

Results

should have worked in a task force enabling more effective cooperation. In addition, more comprehensive cooperation between sales, estimators, and project team would have been essential in the sales phase. For example, last minute changes and discounts made by the sales function to get the deal done might outdate estimations causing some parts of the project being unprofitable. These wrong estimations were present in the project but luckily the case firm was able to negotiate these unprofitable parts out of the scope with change orders. Other important lessons learned included a more precise input from engineering to create a required back-up documentation in claiming, a more careful supplier selection relating to best cost countries and minimizing logistics, and a more careful defining of resources utilized and required to perform some actions.

Project 2

Project 2 was a new kind of project for the case firm. They had no previous experience on either the technology or the country. The project was sold as an EPC contract to build a new plant for Turkish client. The contract value was 65 M€ being split into a local and an import share. The case firm was responsible for everything except civil works. The German office was responsible for engineering and procurement of the import portion, and the local entity in Turkey managed construction and local procurement. A task force was established to the main office in Germany for the first one and a half year. The project was not commercially successful as the contract value dropped by 6 % and costs increased by 5 % deteriorating project margin almost entirely.

Due to the newness of the market area, the case firm needed to scrutinize how to setup the local organization. They compared a permanent establishment (PE) and establishing a local company, favoring the PE approach due to the ability to link all liabilities to the German company. The PE establishment required a lot of work and it took four months to perform all required actions and documentation, such as registration, creating a bank account, renting an office, acquiring work permits, and hiring people. For example, local standards required five local workers per every worker from abroad. The case firm managed to get an exemption for that rule but still needed high amount of local workforce. A local employee was found and appointed as a PE leader to secure easier networking with local authorities and to help in local setup fulfilling local standards.

Results

The original schedule for the project was 36 months but the project was late nine months. Procurement, engineering, and construction were all on-time, but commissioning caused issues being 10 months delayed. The plant was working but the contract obligated 30 days of operation without any flaws. The case firm failed to achieve this multiple time. The plant was running all this time, but multiple minor issues caused the delay. However, at the end, all performance guarantees were met, and the plant worked laudably. This creditable performance was also the reason why the client did not require any liquidated damages even though they could have done that.

Even though the case firm proposed hundreds of change order requests, none was approved by the client. Change order management in general was too inactive and changes were proposed to the client too late. It was difficult to agree on change orders when changes had already caused delays in the project. Change and claim management were mostly reactive and defensive regarding issues raised by the client without paying anything and, hence, threatening the profitability. As a result, it was proven unsuccessful due to the lack of a proactive and comprehensive approach.

Since the project was the first at the country, one objective of the case firm was to get a good reference project to attain more projects in the future. Thus, the relationship with the client was in a high importance as a bad reputation would be very harmful for potential future business in this market area and business line. As a result, the project manager spent considerable time in Turkey and the commercial manager visited there monthly. This deepened the relationship between project teams and individuals due to regular face-to-face meetings. Dinners and other physical meetings were highly preferred over a written communication. The need for a good reference project was also one reason for unsuccessful change and claim management as the case firm did not want to be too hard for the client. Even though the client was very demanding requiring and claiming for everything, no disputes arose during the project.

Risk management was considered by the project manager as his most essential task. The standard template was filled in and updated every or every other month by the project team. However, the project manager considered risk management as rather a daily task since he needed to be all the time aware of the progress of the project and all

Results

ongoing issues. Therefore, a lot of discussing and questioning between experienced specialists was encouraged and supported for on-time decision-making.

In this project, there were other commercial issues requiring a significant amount of work. Firstly, establishing the PE was commercially extremely complicated to optimize all compliance issues with the main office in Germany and the local entity in Turkey. Both tax consultants and an accounting service provider were utilized on site and all invoices went through these advisors. Local requirements for invoicing and taxes and accounting between local and German units caused the case firm many challenges and much work to be solved. For example, the responsibility for taxes changed midway project from the Germany to the Finland office. In addition, there were ambiguities in responsibilities and empowerments and in some cases these did not meet. Furthermore, parallel to the project execution, there was an ERP system implementation, which caused issues with transparency in cost breakdown as the data from the old system was migrated only as a one line item to the new system due to different WBS structures.

Main lessons learned was the importance of the site organization for the project. Fortunately, a local employee was found to facilitate local arrangements. Additionally, a commercial assistant was appointed for both site and the local entity in addition to utilizing tax and accounting consulting. Still, insufficient financial knowledge at site caused numerous issues in accounting between the local and the German unit. The local organization needed to be more knowledgeable in project management as specific local standards were difficult to be tackled remotely from abroad. In addition, procurement staff needed to understand better the client contract to transform its requirements more extensively into sub-contracts.

Project 3

Project 3 represented an EPS type for a Russian client and was executed in a consortium agreement with a partner. The contract defined the case firm to be responsible for the core plant and utilities and the partner for the rest. A Turkish company, hired by the client, managed construction and the client denied the case firm to communicate directly with the constructor. The case firm did not have extensive knowledge about construction in Russia and how to develop working project procedures. Those were

Results

main reasons for establishing the consortium. A tax discussion was another major factor affecting the selected project setup. To avoid establishing a PE, the case firm used a sub-contractor model, in which everything was done through the case firm's Russian office. Despite multiple challenges, the project was a commercial success as the margin increased by 63 % and it created a good reference project in the Russian market area.

The project completion required double the time of the initial estimation, being delayed for four years. At early phases, the client questioned the whole project due to miscalculations and difficulties to negotiate a contract with a construction company. The project was, therefore, frozen for over a year. This stopped the case firm's procurement process but still its engineering and already agreed orders with vendors were proceeding. A minor delay was caused by a requirement for all engineering being for local standards. Finally, there were technical challenges to commission the plant. The client did not want the case firm to be able to handover the project, so they always found new minor issues to request modifications and repairs. Overall, the project was schedule-wise difficult for the case firm as the client did not expose an overall schedule for the project. Deliveries were required whenever the client requested, not when the case firm was ready implying additional efforts for storing fabricated goods.

Change and claim management was quite fierce as the client tried to claim everything they could. Additionally, they were not very open for change order proposals made by the case firm. Thus, change orders were proposed only when necessary from the project execution point of view, as it was known that negotiations would be difficult. Instead, the client pushed an amendment to overcome the interruption caused by miscalculations. The amendment put a high pressure on the case firm through a very tight delivery schedule and documentation. The client claimed very fiercely about missing or lacking documents and late deliveries and the case firm counterclaimed with additional man hours, resources, and insurances. At the end, a settlement was done to overwrite all claims and liquidated damage requests and the case firm agreed to pay 1 M€ as a compensation, even though the client was not deserving that.

The relationship with the client was good at early phases of the project. However, when the management of the client changed, all challenges, such as, aggressive claiming and

Results

disputes emerged. The client claimed the case firm about all kinds of matters even though they had deficiencies also within their own project execution. This escalated to a state where external lawyers were needed to defend the consortium for over two years since the client forced the claim disagreement to the arbitration. At the end, the settlement was done by the management decision for the good sake of the project. To conclude, the fierce claiming harmed both sides of the project as the process required extensive amount of resources, time, and money, all of which was away from executing the contract and finalizing technical and commercial aspects of the plant.

Risk management was done through the traditional template and was reviewed every other month. At the beginning, the project was considered to include multiple significant risks leading to a high risk provision. The high provision allowed the case firm to cover claim and settlement costs and still most of it was released as profit at the end of the project. All in all, the high reserve for risks enabled the case firm to go through project issues and increase the margin level of the project.

In addition to frequent change and claim management, the project had many commercial topics. The Russian office organized site and site services and invoiced the German office. All main equipment was delivered from Western Europe, consisting of 2000 trucks and 120 M€ value of equipment all of which needed to be comprehensively invoiced to receive the money from the bank through letter of credits. Delivered equipment also needed a classification from Russian authorities and, for example, a radioactive insulation material required health certificates. Due to the stopped delivery, the case firm was very cash negative at that time. In addition, guarantees were expiring and extended insurances increased costs. To overcome cashflow problems, the case firm, with a help of an insurance partner, took a risk and assessed for which equipment the insurance is critically needed. That was a successful decision and helped to overcome the state when the project was frozen. At later phase, critical equipment broke needing to be repaired but this was successfully claimed through the insurance. In addition, the case firm needed to adapt changes to engineering of equipment due to changes in the Russian legislation midway the project. Finally, the intercompany change of an ERP system required adaptations since old information was only migrated in a one line item to the new system with differing WBS structure.

Results

The project was designed as a subcontracting model due to the tax optimization and a lack of local knowledge. Everything was executed through the Russian office minimizing taxation and even avoiding VAT. From the project execution perspective, multiple commercial execution procedures were required. There was a total of eight commercial procedures including the subcontracting model in general, payroll shift, transporting and handover, visa handling, taxation, testing and commissioning, personnel management, and negotiations with subcontractors.

As lessons learned, the case firm realized the need for a better adaptation to local restrictions, legislations, and business culture. For example, a partner with a Russian license was required for creating the plant but, on the contrary to the assumption, it was not required to be a Russian company. Internally, more flexibility in switching budgeted items between involved delivery hubs was needed. For example, sourcing budgets for different market areas did not stand and required too much work to get agreed to be shifted. Finally, there was a lack of clarity about legislation for the chosen project setup relating to VAT. In addition, the fact that consortium partners had different project execution models, that was the subcontracting model and the PE, fortunately did not rise any significant issues.

Project 4

Project 4 was an EPC contract and the client, and practically the country Morocco, was new for the case firm. The value of the contract was 80 M€ and the technology used was complex and novel. Several proposals were made for the client and the signed contract was different from the plant project the case firm was anticipating for. As a result, an inadequate effort was put in the sales phase and the contract was not in favor for the case firm. Firstly, the contract was only in French. Secondly, the client needed to approve every decision during project execution, but they took no accountability for anything they approved leading the case firm to bear all costs and risks of the project. Additionally, claiming the client was impossible and making any changes was difficult. The case firm saw an opportunity for a continuous service business as the plant needs to be renewed every two years. This project was still on-going, but the margin forecast had already been dropped down to the half of the original estimation.

Results

The plant was supposed to be built in 24 months according to the contract. However, there was a misunderstanding about the starting date of the project. The contract was awarded for the case firm in December 2018 and signed only afterwards. Due to problems with clarifications with documents and bank guarantees, down payments were received only in May and in June 2019 for the local and the import portion, respectively. As a result, there was an ongoing disagreement whether May or June was the point when the clock started ticking. Minor delays had occurred due to technical issues and difficulties to find a new supplier due to very strict restrictions, but the overall schedule of the project was still on track, no matter about the starting day.

Every extended day would result 88 k€ of liquidated damages, which would only be counted in the handover. That was the reason for the significance of the starting day. The unfavorable formulation of the contract and the reluctance of the client to sign any change orders complicated change order management. A couple of engineering changes was agreed with the client but in general the success was poor. The case firm accumulated many change order proposal packages to minimize change negotiations. In addition, the client could not be claimed as they were not providing binding information. To succeed in change propositions, a very detailed documentation about what, why, how, and when was required to be compiled. Additionally, the contract included unusual items for the case firm which caused problems in execution and a pressure for changes. All in all, the client did not afford scope changes, but profits were needed to be secured despite non-beneficial scope of the contract.

In general, the relationship with the client was adequate. There had not been disputes needing any external help to solve the issue. However, the disagreement with the starting date was left in the background. Client did not approve how the case firm handled invoices and bank guarantees and therefore did not agree with the later starting date. Either party was not willing to create a severe dispute as everything had gone smoothly, and the project was on track to be finished on time. However, the issue was smoldering, and any significant delay would jeopardize the project outcome due to high penalties for extended days.

Results

A local person, who spoke both Arabic and French, was utilized to help on site. He was a new employee of the case firm but had extensive local knowledge. Therefore, he was arranging everything needed on site and helped in local sub-contracting and cost controlling. Additionally, there was a site manager and a contract manager on recently opened site.

The risk plan was performed by utilizing the standard template, and it was reviewed every three months. In case of any urgent risk, more frequent evaluation was performed. It was mostly the job of the project manager and the commercial manager, but the engineering manager and the procurement manager, as well as other project functions participated when necessary.

The scope of the contract was divided into local and import portions. The client did not pay VAT and therefore local and German invoices excluded VAT. The 19 % VAT would be only paid for the delivery of the completed plant. This tax exemption of the client required the case firm to use a specific project model and everything needed to be performed through the local PE. However, as the case firm had already a local entity in the country, authorities was concerning the arrangement as both, a local entity and a PE, cannot exist in parallel. Currently, no issues had arisen. The case firm did not have any local experience on taxes and therefore local advisors were utilized in such decisions. Insurances was covered with standard insurances of the case firm and no additional work was required.

The project mostly utilized standard commercial guidelines of the case firm. However, invoicing required more strict and specific guidelines due to complicated payment terms. Traditionally, there were two types of terms, but this project was utilizing four of those with strict rules and requirements for needed attachments. Additionally, unfavorable payment terms caused a negative cash flow for some time as the client was only paying for the case firm after there was a proof that they had paid to sub-contractors. As a result, the head office in Finland financed the local unit to run the project.

Lessons learned from the project was mostly related to the formation of the contract. Firstly, the fact that the contract was only in French combined with the lack of fluent

Results

knowledge of the language caused issues with interpreting the contract. In addition, the contract was not favorable for the case firm partly due to inadequate efforts, as mentioned earlier, but also as the project team was not involved in the sales phase of the project. The project manager and the commercial manager should have been involved earlier to eliminate issues caused by unfavorable terms of the contract. Another lessons learned was that legislation, restrictions, and habits of the country of the client should have been analyzed and considered more extensively to achieve a better relationship with the client and to avoid issues in project execution, for example, in selecting the local partner.

Project 5

Project 5 was a part of a bigger customer project where the case firm was building two containers with an EPC contract in Dubai. The contract value was 92,4 M€ and there was one contract between the German unit and the client. Local subcontracting and purchasing were internally acquired from the Dubai office. Everything was delivered in the name of the client to avoid taxation. The client had also hired a management company with much resources causing an increased workload for the case firm due to all the questioning and required documents. There were task forces for both the Germany and the Dubai office. A site manager together with a site commercial manager managed all issues happening on site. Commercially, the margin dropped to the half of the original estimation but due to all technical issues the project team faced, it can be commercially judged as a decent job.

The project started in 2015 and was scheduled to be completed in October 2018. However, the case firm had completed its responsibilities but was still waiting the client to run the performance test. The first delay was relating to a confusion about local licenses. The case firm thought that an Emirates license would be sufficient but that was not the case and one sub-contractor could not come to site. It took six months to evaluate the issue and finally get right visas. The second delay was for eight months and was caused by a subcontractor who was not able to provide the agreed scope, eventually solved by de-scoping. Thirdly, the case firm realized issues with the technology in the middle of the project and mitigated the risk by implementing changes

Results

based on lessons learned from another similar project. This took five months but was a successful decision avoiding more issues to arise in the operation phase. Finally, there were 18 months delays from the client's side as they were not able to provide gas and similar deliveries. Concurrently, the case firm was late with their part of the project due to issues described above.

Even though there had been several delays, the case firm had not been required to pay any liquidated damages due to successful negotiations about changing the mechanical completion date. Still, the performance test was not yet done, even though the case firm had required it, but no additional costs was expected from the test. 16 change order requests, from over 50 proposals, was accepted by the client and the approved value was 4,8 M€. Most of change orders were relating to design changes made for the project. Additionally, a service person for six months was included to handle services and some additional work for the plant. The case firm also managed to claim about a half of delays which was a reasonable success. In addition, a very effective claiming towards subcontractors for their delays led to deductions for costs. There was also a successful settlement with a main contractor about the case firm's issues and no claims needed to be paid. The claim management in general required extensive amount of work due to all questions and requirements from the client's management company. In addition, contract terms did get the leverage out from the case firm by requiring implementation of changes to begin before an agreement about the payment was done.

There were many changes in the project team of the case firm as both the project manager and the commercial manager changed. The client demanded the project manager to be substituted when there was a conflict about claims and the relationship was poisoned. The new project team managed to recreate the relationship allowing more cooperation at the end of the project. No further disputes arose even though there were disagreements about multiple issues. The technology of the case firm was the last part in the process chain of the client's investment and therefore the case firm was accused about performance issues. Fortunately, they managed to prove that the fault was elsewhere as the input was already flawed. Additionally, there was a disagreement about the closeout value where the case firm should have gotten an additional 2-3 M€ but had not much leverage left as they had already left site. Another major dispute was

Results

with the subcontractor with scope issues, which led them to leave site since they did not agree on claims and terms of final invoicing. However, the case firm managed to negotiate the subcontractor to return and finish their job. This also affected to the need to substitute the project manager since the Dubai office did not agree on actions made leading to an internal dispute.

Risk management was done very well by the initial project manager and the initial commercial manager. Many design problems were already overcome based on implementing lessons learned from another technologically similar project. A currency fluctuation was considered as another major risk. Hedging as a mitigation strategy was successful achieving even additional revenue for the project. The issue with the subcontractor was not recognized and it should have been solved by descoping much earlier to avoid delays and disputes with project parties.

Commercially, the contract was very well detailed, and it defined comprehensively insurance practices, risk provisions, and change order procedures. Instead, cost controlling procedures were not established at the beginning of the project causing problems about responsibilities and cooperation between cost controlling in the local and the German office. Later, procedures were established, and roles and responsibilities were defined. At the beginning, there were no taxes due to the client's entitlement. However, starting from 2018, new VAT legislation caused an extensive amount of work for figuring processes and registering the firm under a VAT act. These actions required help from the tax department and both the local and the German accounting. Bank guarantees for both the industrial completion and the final handover, in addition to the final payment being linked to the performance test, were causing cash flow problems for the case firm. Work permits and visas required much work as well, as every visitor on site needed a visa and issues arose with a specific contractor.

The major lessons learned was not to include too much innovation in such a major project. Most of issues were related to design problems as enough testing was not performed in smaller projects. Other lessons learned was relating the case firm not working on a full contribution when also the client was late. However, if the case firm would have finished their job earlier, they could have claimed more from the client's

Results

delays. The third major one was about not leaving the final invoice to the performance test but rather tie it to the mechanical completion as the client was stalling with the test causing the case firm's cash flow issues. In general, the leverage must not be given away before getting money from the work. Finally, when a subcontractor was honestly telling that they cannot provide, the project team should have earlier found an executable solution and not put more pressure to the contractor.

Summary

All in all, projects had similar commercial issues in their execution. Firstly, local requirements and legislation caused multiple issues, whether they were relating to visas, local contractors, or licenses required for either the case firm or their partners. Thus, a more thorough market and regulation analysis during the sales and early phases, with the help of commercial manager, could help to avoid these mistakes and challenges. Furthermore, utilizing local knowledge and expertise becomes an essential method as commercial managers abroad cannot themselves be experts about all local requirements leading these issues to arise.

Secondly, inadequate and unfavorable contracts, especially with payment terms, caused issues in multiple projects. Project managers and commercial managers were too little involved in the sales phase to provide their knowledge about project execution. Thus, projects were sold with a contract with some unfavorable payment or responsibility terms and conditions. Both project managers and commercial managers needs to be involved earlier and more extensively to ask right questions and review the contract commercially to decrease the number of issues arising later in the execution phase.

Finally, partly relating to unfavorable contract terms, change orders and claims was not as successful as they could in case projects. Thus, clear change and claim management processes needs to be established and agreed with the client already in the contract. Commercial managers need to also be proactive and transparent by documenting well all changes during the project execution and communicating them immediately when they arise to the client. By doing so, the client would experience that the case firm is proposing improvements to the client's plant or equipment rather than trying to collect money for their own mistakes.

Results

The general view from project managers of case projects was that each project requires a commercial manager at least as a possibility to consult such a person in complex issues. Naturally, also commercial managers perceived their contribution in projects as essential. In any project, even in a small one, a lot can happen commercially where knowledge of the project manager would not be enough. Mostly the contractual complexity defines the need for appointing a commercial manager for the project enabling a project manager to focus more on managing the project holistically.

The client, country, and contract type, rather than the contract value, were suggested based on case projects as most significant factors creating the need for a commercial manager. For example, EPC projects were acknowledged to require a fulltime commercial manager and the most complicated ones also commercial administrators and/or site commercial managers. The evaluation needs to already be done in the sales phase on required commercial roles and the extensiveness of their required involvement. The commercial manager together with the project manager needs to impact on the contract formulation phase on that evaluation.

Main characteristics in case projects that affected their commercial execution are presented in Table 9. It was discovered that each project had its own context for which commercial management needed to adapt to, and which caused differences in possibilities to achieve a commercial success. Case projects varied quite significantly through all these characteristics. Characteristics include the novelty and the complexity of the used technology, novelty of the market area, ownership of the client, cooperativeness of the client, possibilities for changes and claims, extensiveness of multilocation, contract with the client, and other category.

Results

Table 9: Project characteristics affecting the role and the success of commercial management.

	Novelty and Complexity of the Technology	Novelty of the Market Area	Ownership of the Client	Cooperativeness of the Client	Possibilities for Changes and Claims	Extensiveness of Multilocation	Contract with the Client	Other
Project 1	Proven	Well-known	State-owned mining company	Demanding, Bureaucratic, Disobedient	Eager for contract extensions, Client managed construction	Germany, local, Finland, Sweden	EPS, Well-detailed with some ambiguous terms	Currency hedging
Project 2	Novel	New	Private conglomerate	Demanding, Fulfilled their obligations	Not prepared to pay extra, Tried to extend scope without paying more	Germany, local	EPC, Unfavorable payment terms, High liability	Permanent Establishment, Taxes, Local permissions
Project 3	Proven, Complex	New for construction scope	Private mining company	Fierce, Demanding, Lack of transparency	Client claimed everything, Not open for change orders	Germany, local	EPS, Well-defined, Official contract in Russian	New project model, Extensive invoicing, Certificates
Project 4	Novel, Complex	New for major project	State-owned mining company	Bureaucratic, Verifies everything but has no accountability	Claiming impossible, Not eager for changes	Germany, local	EPC, Contract only in French, Unfavorable, Unusual scope	Project setup ambiguity, Complicated invoicing terms
Project 5	Novel, Complex	Well-known	Public mining company, Indirectly owned by government	Demanding, Fierce, Big management firm supporting the client	Open for changes and claiming, Required much work and reasoning	Germany, local	EPC, Well-detailed, Unfavorable payment terms	Visas and permits, Tax legislation changed, Currency hedging

Firstly, the novelty and the complexity of the technology used in the project had a tendency in causing technical issues that needed to be solved. These were traditionally managed by the engineering team. However, the technological novelty and complexity strongly affected the need to negotiate changes and claims, as more issues and therefore more changes were required when implementing a novel and complex technology when compared to a proven one. This also increased the need to defend against claims from the client as the novelty and the complexity of the used technology led to the higher number of fluctuations and delays.

The second major characteristic was the novelty of the market area where the project was executed in. The experience in the market area, and more specifically in the country, affected the work required for a project setup, taxation, work permits, and other regulations and legislation. These issues were strongly project specific, and therefore caused varied problems in multiple projects. Many case projects were executed in a country where such a project had not previously been executed, leading to high number of issues relating to these country specific factors. In addition, the extensiveness of multilocation regarded the extensiveness of participating locations affecting the need for a tax optimization, as well as cash flow management and alignment between different entities.

Thirdly, the cooperativeness of the client was the most impactful characteristic affecting on the ability for change and claim management. Here, previous relationship with the client, ownership of the client, and in general practices and habits of the client defined how eager the client was to negotiate about change orders and how fiercely they aimed to claim the case firm. Secondly, the contract with the client had also a significant effect, since terms and conditions defined the ability for changes and claims, as well as invoicing procedures and project setup. All in all, these aspects of the client needed to be evaluated already in the sales phase, to better understand possibilities in project execution and to achieve a contract favoring the case firm and taking the leverage out from the client to aggressively claim the case firm.

4.2 Commercial management areas organized in case projects

The matrix table about management areas related to commercial management, from the Figure 5, and key six project roles participating in these areas is presented in Table 10. Results derive from the first template filled in during each interview with responses with the scale given from 0 to 2. Each column under each role presents one project, and projects are in the same order than presented above. The first row in each management area presents project manager's and the second one commercial manager's response. Value 2 refers to a high involvement, or in other words, a responsibility in that management area. Value 1 refers to a medium involvement meaning a supporting role. Value 0 refers to a very low or no involvement. The color coding in a red-to-green scale highlights differences in involvement levels. Thus, green areas show where the high involvement is required.

Results

Table 10: Project roles and their involvement in different commercial management areas in case projects.

		Project Manager					Commercial Manager					Engineering Manager					Procurement Manager					Project Controller					Scheduler				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Procurement Management	PM	2	2	1	2	1	0	1	2	1	1	1	2	1	1	1	2	2	2	2	2	1	1	2	0	0	1	2	0	0	1
	CM	2	2	2	1	1	0	1	1	1	1	0	2	2	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
Contract Management	PM	2	2	1	1	1	2	2	2	2	2	1	2	1	1	1	0	0	0	0	1	1	1	0	0	0	1	1	0	1	1
	CM	0	2	2	2	2	2	2	2	2	2	0	1	2	1	1	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0
Relationship Management	PM	2	2	2	2	2	2	2	0	1	0	1	2	2	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	CM	2	2	2	2	2	2	1	2	2	2	2	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Communication Management	PM	2	2	2	2	2	2	2	0	1	1	1	2	2	1	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
	CM	2	2	2	2	2	2	1	2	2	2	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Risk Management	PM	2	2	2	2	2	2	2	2	2	1	2	2	2	1	2	2	2	0	1	1	2	2	0	1	1	2	2	1	1	1
	CM	2	2	2	2	2	2	2	2	2	2	0	1	2	1	1	0	1	1	1	1	1	1	2	0	0	1	1	2	1	1
Change Management	PM	2	2	2	2	1	2	2	2	2	2	1	2	2	1	1	0	1	1	1	0	0	1	2	1	0	0	1	2	1	0
	CM	2	2	2	2	2	2	2	2	2	2	2	1	2	1	1	2	1	0	1	1	0	2	2	1	1	0	1	1	1	1
Claim Management	PM	2	2	2	2	1	2	2	2	2	2	0	2	2	1	1	0	2	1	1	1	0	1	0	1	0	0	1	1	1	1
	CM	2	2	2	2	2	2	1	2	2	2	2	1	2	1	1	2	1	2	1	1	0	1	1	1	1	0	1	0	1	1
Cash Flow Management	PM	2	2	1	1	1	2	2	2	2	1	0	0	0	0	0	0	1	0	1	0	2	2	2	1	2	0	1	0	1	1
	CM	2	2	1	1	1	2	2	2	2	2	1	0	0	0	0	0	1	0	1	1	2	2	1	1	1	1	1	0	1	1

PM = Project manager; CM = Commercial manager; 1 = Project 1; 2 = Project 2; 3 = Project 3; 4 = Project 4; 5 = Project 5

Unsurprisingly, commercial managers were highly involved in all management areas except in procurement, where the involvement level was medium in average. Additionally, relationship and communication management towards the client had varied responses, but lower values became mostly from project managers. There were even cases where the project manager thought that no involvement was applied but the commercial manager perceived a high involvement. As a result, there appeared to be an ambiguity within project teams about the commercial manager's involvement in communicating with the client and building the relationship. Otherwise, there were no significant differences between the project manager's and the commercial manager's responses and neither between different projects.

Procurement was the only management area where commercial managers were not in lead with project managers. The general view was a medium involvement from commercial managers. However, in one project the involvement was considered as none by both respondents. In procurement, obviously, procurement managers were responsible for the function. All other key roles supported nearly equally. Project managers were, due to the ultimate responsibility about all project areas, clearly the second most involved in procurement. Differences between projects were quite minor.

Contract management was commercial managers' responsibility in all case projects and project managers had the second highest involvement. Additionally, engineering managers were supporting in this area due to the best knowledge about all technical

Results

issues. Other roles had a very low involvement in contract management. Similarly, in both communication and relationship management, project managers and commercial managers involved the most, engineering managers strongly supported, and other roles had a very minor involvement. However, project managers had the highest responsibility and commercial managers highly involved but rather supported project managers in the lead.

Project managers and commercial managers shared the responsibility in risk, change, and claim management with a high involvement throughout almost all responses. In all these areas, engineering managers had the highest supporting role, again due to their technological knowledge required in all these areas. All other roles were contributing information from their function and therefore all roles had at least a medium involvement on average in these management areas. Additionally, project-specific factors had an impact on required involvement from supportive roles. Required information and knowledge was dependent on the nature of potential risks and types of changes and claims. Therefore, there was a high variation between responses and almost all supporting roles included varied responses from 0 to 2.

Commercial managers were clearly responsible for cash flow management. Both project managers and project controllers had also a medium to high involvement but due to different reasons. Project managers shared the responsibility with commercial managers to overcome all issues and to make all decisions. Instead, project controllers were responsible for performing day-to-day tasks in cash flow management and for reporting commercial managers about deviations and other financial issues that arose.

To summarize, commercial manager was found as a central integrator of commercial management areas, where only procurement was managed by another role, procurement manager. Project manager shared the responsibility in all areas due to the ultimate responsibility of the project. Otherwise, other roles provided support and input in areas where their expertise was required.

4.3 Commercial manager's responsibilities in case projects

The commercial role in five case projects is described in more detail. The emphasis is on how the commercial manager has participated in commercial management areas presented in the literature, and what has been activities that the role has performed in case projects. Additionally, the comparison between projects is presented to show how different responsibilities of commercial managers have influenced on project execution.

Project 1

The project manager and the commercial manager of Project 1 had an extensive history in working and implementing projects together. Thus, they had developed a mutual understanding about responsibilities and the division of tasks within a project. This cooperation had been very successful. They were considered as one of the most merited project lead in the firm thus being handed many major projects to be implemented by this team. The commercial manager was the second in the project hierarchy meaning that he deputized the project manager when project manager was inhibited. The commercial manager in Project 1 had mechanical engineering and production management as his background without no extensive legal training.

Due to being a native English individual, the commercial manager was responsible for written daily correspondence both internally and towards the client. In addition, he was responsible for compiling and presenting monthly project reports in internal and steering committee meetings. It is important to write letters and prepare reports and minutes of meetings to leave opportunities for future change orders and claiming open, and similarly protecting the company from claims. The commercial manager facilitated internal communication about insurance policies and hedging, handled technical and commercial contractual letters with the client, and helped the project manager in a verbal daily communication and meetings with the client.

The commercial manager supported the project manager in relationship management and the communication with the client. They had weekly meetings with the client where the commercial manager mostly listened and watched, for example, body languages. They went only twice to site but was considered as enough due to the EPS status of the contract. This was mostly done to build a deeper relationship with the client with face-

Results

to-face meetings. Additionally, the case firm aimed to build the trust by communicating early about changes and their honest effects, both costs and benefits, when the client still had the possibility to decide on those. The project team managed to build a proper relationship with the client even though it was not considered as the easiest client.

Internally, the commercial manager was responsible together with the project manager in weekly project meetings where all key managers participated. In addition, there was a need for a daily discussion within managers, making the task force necessary for this size of a project to enable mutual lunches and after job gatherings. The commercial manager highlighted the need for the unofficial discussion between key parties to achieve success in project implementation. Being proactive and extrovert person asking questions and talking about problems with different project functions kept the commercial manager updated about all issues happening in the project. Simultaneously, the expertise from different project functions was more extensively utilized in problem-solving.

The commercial manager was responsible for the financial state of the project. This required daily monitoring of cost controlling activities and taking required actions in problem situations. Cost controllers were responsible for filling in numbers in the system while the commercial manager managed the process and made significant decisions. This included a monthly supervising of the payment request process. Additionally, the commercial manager monitored cash in from the client and the cash flow status of the project monthly ensuring the liquidity to pursue the project.

The commercial manager was the primary party who managed the contract with the client. He did all contract negotiations and contract management with the client. This included analyzing terms and conditions of the contract at the early phases of the project and whether the case firm was receiving or paying money in different occasions. In contract management, an active role was required to anticipate situations that might happen and getting most out of the contract. Additionally, contract terms and conditions needed to be communicated and transferred to different functions of the project. The commercial manager needed to be very careful what to say officially between project parties to avoid issues that the client can claim from the case firm later.

Results

A high number of change orders required significant amount of work from the commercial manager to achieve such a high success rate. The commercial manager evaluated change order requests and prepared change orders to be presented for the client with required back-up information and documentation. Here, it was essential to communicate with procurement and engineering functions to utilize their expertise to build strong reasoning for the change order. After that, changes were negotiated with the client, and especially with claims, usually counter claims were issued. Additionally, it was commercial manager's job to defend the case firm about claims presented by the client. The project team avoided using the term claim to the client due to its negative sound and aimed to present them as change orders.

Towards the procurement process, the commercial manager had no significant responsibilities as the procurement function handled it. However, the commercial manager was involved in preparing the implementation plan and transferring terms and conditions of the client contract to requirements for procurement. In addition, his expertise in commercial knowledge was utilized in problem situations with suppliers and reviewing terms and conditions of supplier contracts.

In risk management, the commercial manager's role was to arrange the filling in the risk management template in cooperation with the project manager. All relevant expertise from different project functions, such as engineering and procurement, needed to be involved. The commercial manager's role was to combine relevant information from functional experts and to ensure that all issues have been considered in the risk assessment. Additionally, the commercial manager ensured that the risk analysis matches with the risk provision level of the project.

The project manager and the commercial manager were first persons hired to the project and last ones to close the project. At the beginning, the involvement of the commercial manager was the highest since the contract needed to be learned and all project procedures, communication practices, and task force arrangements needed to be defined. At the construction phase where change and claim management begun, the involvement level climbed again back to very high. With a very limited site team, the commercial manager was also coordinating and arranging site services. The

Results

commercial manager saw that he should have been involved even earlier in contract negotiations as certain issues were already frozen that could have been modified based on the commercial manager's expertise to avoid later challenges.

Project 2

In Project 2, the project manager and the commercial manager were not familiar to each other and mutual working practices and responsibility areas were not already established. This led to the situation where the commercial manager was performing tasks that was not in his responsibility and, consequently, some other tasks were left to less focus. The project manager felt that the commercial manager was not proactive in his tasks and was needed to be requested to do those tasks. Additionally, the project manager needed to perform some tasks that were in the commercial manager's responsibility. This was also intensified by all the work needed from the commercial manager to protect the project from all claims and additional requirements the client tried to pursue. Additionally, there were issues where the commercial manager did not have a full authority to sign things under his responsibility areas complicating management of commercial issues. The commercial manager had a technical education and cost controlling as a professional background.

The commercial manager was responsible for evaluating the right project setup and, consequently, establishing the PE for the project. In addition, the commercial manager was expected to build the local team and to support the local organization with all commercial issues that arose. The task was to follow-up site activities knowing what was going on, what were all expenses and coming money, and handling work premises. Additionally, the commercial manager was ultimately responsible for handling taxes, invoices, and insurances. However, this was not completely the case and the local entity did not receive the support that they needed. More proactive site visits from the commercial manager to see the client in commercial topics would have been helpful.

The task force at the beginning of the project facilitated the cooperation of the project team. The project manager and the commercial manager worked closely and communicated every day. Additionally, the commercial manager was present in every project meeting to get an understanding about all ongoing issues, even technical.

Results

However, the commercial manager could have involved himself more actively by challenging people to raise commercial and contractual issues. The commercial manager did the formal and written contract-related communication with the client, established the commercial setup for reporting, and communicated with management about commercial topics. The project had much going on technically and therefore the engineering manager had a high participation in communication with the client leading the technological discussion.

The commercial manager was highly involved in cash flow management and cost controlling. He ensured that money came in before going out. This included driving invoices and milestones, as well as being aware of all payments. Cash flows for both head and local units needed to be considered separately. The commercial manager established the cash flow template, managed it, and even participated in cost controlling activities. Dedicated person for cost controlling would have been beneficial, since financial reports were not always sufficient. The commercial manager was fully employed and had not enough time to other commercial tasks, such as, change and claim management.

Change and claim management was not successful at this project. Even though many requests were sent, none was agreed on with the client. The commercial manager should have been more proactive and stricter in change negotiations. Requests needed to be pushed to the client more actively and earlier. In addition, local people like the PE leader should have been utilized since he had knowledge and experience on how to negotiate with local people like the client. At the end of the project, change and claim management was mostly defending the case firm about all requirements the client claimed. All in all, the commercial manager did not have time to effectively organize change and claim management and that resulted the radical 0 % success rate with changes and claims.

In procurement process, the commercial manager had no role. However, he ensured that all contractual issues were converted into sub-contracts and that procurement function understood commercial issues of the client contract. Additionally, the commercial manager should have helped in guiding the procurement function, in establishing

Results

procedures for purchase orders and in problem situations supporting in problem-solving and in follow-up that problems were fixed. This cooperation, however, was lacking, and procurement reports were inadequate. Procurement function ordered supplies, but proper follow-up was not performed.

The project manager, commercial manager, and engineering manager were mostly responsible for risk management of the project. The commercial manager performed all calculations for the risk assessment, analyzed the needed risk provision, and increased, released portions of provision when required, and finally reported about the risk assessment to the entire project team and to the steering committee.

The commercial manager was fully loaded during all project phases. The set-up phase was the busiest after which the workload decreased slightly. In the construction phase, the commercial manager should have followed deliveries more consistently. In addition, more frequent site visits were needed to better know what happened on site. Change and claim management should have been done more extensively and cost controlling should have been delegated to other project roles, such as cost controller. In the handover phase, the involvement increased again due to all commissioning issues the case firm faced.

Project 3

Project 3 was implemented with a consortium partner. The partner was an official consortium leader, but the case firm was practically leading as they had the most responsibilities about the plant. As a result, project decisions were made within a bigger team and more expertise was utilized. This also meant that the project manager and the commercial manager could not decide on all things by themselves. The project manager and the commercial manager had not been previously working together but found a mutual practices quickly. The commercial manager had his background in microeconomics and being an industrial and commercial apprentice.

The commercial manager was responsible for the written communication, such as, emails and letters with the client and the consortium partner. The project manager handled straight communication. They were both present in weekly video conferences

Results

with the client and in weekly delivery meetings. Similarly, the commercial manager was participating in monthly project and steering meetings and was responsible for all commercial topics, also towards the consortium partner. In addition, the commercial manager was contacting vendors and Russian authorities. All permits were in the client's responsibility, but the commercial manager supported them by providing documentation. The project manager, commercial manager, and engineering manager worked in the same floor and discussed together daily. The project controller was also located close and the commercial manager dropped by daily. With the Russian office, the commercial manager was in contact several times a week mostly about invoices.

The most significant barrier in building the relationship with the client was a lack of knowledge of the Russian language. Interpreters were needed in all communication since only project assistants spoke Russian. After the management change in the client's project organization, the project team of the case firm went into a defensive strategy, instead of building the mutual trust, as the client became quite hostile. However, at the end when all disputes and disagreements about claims were solved with a legal help, the attitude was kept cooperative through transparent communication with the client.

The commercial manager's role in cash flow management was mostly handling of the budget and payment follow-up. These included the invoice handling relating to the client, Russian office, and consortium, and managing bank guarantees. The client rarely paid on time causing the commercial manager to consult the contract department about reasonable actions. In addition, he assisted in cost controlling and monitored arisen issues, for example relating to different budgets. The commercial manager prepared cash flow reports for every steering and management meeting monthly. The most critical phase was when the project was questioned but expenses for suppliers were running needing the commercial manager to handle the cash flow issue.

The commercial manager was not involved in any way in the sales phase. He got a complete contract. The commercial manager was responsible for setting up the project and later establishing the consortium and internally the subcontracting model. Similarly, the responsibility about commercial procedures for the project lied on the commercial manager. Due to the complicated project setup and Russian standards,

Results

standard procedures needed to be strongly modified into project specific procedures. Additionally, the commercial manager was authorized to sign small deliveries and in the most complicated issues, the contract department was consulted.

Change and claim management of the project involved the commercial manager significantly mostly due to the high number of claims from the client. The commercial manager was responsible to handle claim and change management, but every project member was encouraged to report any variation order request and a total of 160 events were created about commercial and technical issues. The client was not eager to discuss about change orders and therefore the commercial manager needed to evaluate which requests and how to present to the client. All in all, the project required much work on negotiations about changes and claims, legal reviewing through the contract, and preparing and modifying documents to support argumentation.

In procurement, the commercial manager supported to arrange deliveries and documents needed. The bureaucracy in the Russia required extensive work with to provide sufficient documentation. Otherwise, procurement function negotiated and handled purchases by themselves and the commercial manager was only involved when there was an overrun in the budget of the supply packages. With the construction company, the commercial manager was involved in supervising their operations.

In risk management, everybody was encouraged to contribute to the risk identification and evaluation process. It was the project manager's and the commercial manager's role to combine all this information and perform the final evaluation from gathered information. The commercial manager was also responsible for evaluating all commercial and contractual issues, such as payment risk. Based on the risk analysis, all risk insurances and risk provisions were managed by the commercial manager.

The involvement from the commercial manager was a fulltime job during the whole project. However, due to the enormous amount of deliveries to the site, that was the phase which loaded the commercial manager the most, instead of the setup phase like in other case projects. At this stage, the commercial manager was overloaded and had difficulties to concentrate on all other tasks in the best way possible. Otherwise, the workload was steady and appropriate, so everything was be done properly and in detail.

Project 4

For the commercial perspective, the start was the most difficult phase in Project 4. Bank guarantees needed to be created with local banks, where language and practice differences created a lot of miscommunication and misunderstanding. The client was very bureaucratic which made the decision-making and commitments difficult. The commercial manager was responsible for all commercial issues and especially transferring contract terms and conditions into requirements and procedures for different project functions. In general, the role was to consolidate information from different functions and managing financial issues of the project based on that. The commercial manager and the project manager had not worked together previously. The commercial manager's background was in management studies, especially in relations and business and later some minor legal courses has been taken.

The project manager was, like usually, the first contact person of the case firm in the project. The commercial manager took the responsibility of the correspondence and the relationship with commercial people from the client's side. The reluctance of official letters by the client transformed the correspondence to be more email-based and the project manager had to travel a lot to the client for the face-to-face communication. The commercial manager did not have a possibility to travel as frequently but joined when possible and especially when commercial issues were on table. Communication limitations created a need for a balance to get things recorded in a written format without official letters. For an internal communication, a task force was established for key project roles to interact with each other daily. The commercial manager was also responsible for creating reporting procedures. They ensured that financing, cost controlling, and procurement were reported correctly and presented to the client, in project meetings, and in steering meeting. In addition, sales and contract departments were provided a feedback to develop their knowledge to achieve better contracts for following projects.

The project team, especially the project manager, considered a lot of establishing a good relationship with the client. Main consideration was to build a personal relationship with the client's project manager. This was achieved by frequent face-to-face meetings

Results

and even going to drink tea with the client. The client needed to be understood in a personal level to completely understand their aims for the project. The project manager met the client in person twice a month as the correspondence was not enough to build such a relationship. Additionally, the aim was to show that the case firm was not only going to the client when there were problems but also proactively providing help in decision-making.

The commercial manager was responsible for monitoring the cash flow state and the forecast. She established cost control procedures relating to how to plan, monitor, forecast, and report variation in cost. An essential issue was to define responsibilities between the local and the German cost controlling. Responsibilities included who provides what information and who does reports. The main issue was to manage three parallel cash flows ensuring money for the local entity. All in all, the commercial manager acted between cost controlling and the project manager monitoring and managing the process while transferring only major issues to the project manager.

Due to the unfavorable contract, establishing invoicing procedures required an extensive amount of work due to different invoicing models and strict rules for attachments. Clear understanding about different invoicing terms and practices needed to be created to provide attachments extensively enough. The commercial manager was also responsible for all visas, work permits, insurances, and health certificates required from all people going to site. Furthermore, the commercial manager monitored all procedures and ensured that they have been established, followed, and executed correctly in the local entity. Due to the contract, most of efforts of change and claim management consisted of the strategy how to provide necessary change order requests and related back-up information, and formatting appropriate change order request packages to avoid frequent change negotiations.

The commercial manager was not involved in the procurement process but supported in specific situations. For example, the commercial manager participated in transferring contract requirements into contracts with suppliers. She supported in establishing procurement procedures, including the contact person, bid evaluation, reporting, approval process, and authority to sign purchase orders. The commercial manager was

Results

supporting local procurement, for example, in purchasing cars. Finally, there was no direct involvement with suppliers but problem situations like deviations from the budget and corona virus issues required the support from the commercial manager.

The involvement of the commercial manager had been quite steady throughout the project being close to a fulltime job. There was a peak at the beginning when the contract needed to be reviewed and understood, and all procedures needed to be established. In addition, creating invoices, tax and insurance handling, and cash flow calculations for the risk analysis burdened the commercial manager. At the procurement phase, the involvement was more peaceful, but increased again when site opened and change and claim management begun.

Project 5

Project 5 had multiple changes in key project roles during the project execution. The project manager was substituted, the commercial manager left the case firm and the site manager retired. This caused issues with continuance of working practices and knowledge transferring. The change of the commercial manager was the first of those and therefore the new commercial manager was in essential role to overcome these changes. The project managed to overcome all role changes without major issues and even making the relationship with the client better. The new project manager and the new commercial manager had no previous experience in leading a project. The new commercial manager was the same than in project 4 so her background lied in management studies.

As usual, the project manager was the contact person towards the client. He managed the communication with the client and the commercial manager wrote all contractual and official letters. For commercial issues, the commercial manager drafted and answered directly to the client, communicated internally, and presented reports in internal steering meetings. The project manager and the commercial manager interacted daily about project issues and ensured that they both were on the same level of details about the project. Additionally, there were weekly project meetings where things were discussed officially, and the commercial manager had weekly remote meetings with the client's commercial manager. At the construction phase, the commercial manager was

Results

daily in touch with the site commercial manager to ensure knowledge on events on site and to jointly perform the decision-making. A correspondence management tool was utilized to manage communication between all parties enabling a later access to communication documents.

As all customer interface roles were changed in this project, the relationship needed to be completely rebuilt. The project manager participated officially in the client site meetings, but also in unofficial meetings to create a personal relationship. They decided together with the commercial manager to ignore a minor issue that had been disagreed within the project to signal that new and more cooperative leading methods was applied. In addition, the site commercial manager was on site managing local issues and discussing with the client. This diminished the role of the commercial manager, and she never went to site. For the first ten months, there was a contract administrator on site handling all subcontracts but that was not necessary since the commercial manager was still needed to finalize issues.

The commercial manager ensured that finances were in place, including invoice handling, payment follow-up towards the client, and monitoring budget, hours, savings, and overruns. She negotiated payment terms, approved subcontractor payments, and shifted budgets between entities when necessary. In general, cost controllers entered figures to the system and reported the financial status to the commercial manager. The commercial manager solved all issues with an approval from the project manager. At the beginning, there were no clear responsibilities and working practices between different units causing issues in cost controlling. Thus, the new commercial manager created cost controlling procedures for more fluent cooperation between units. Cost controllers were also encouraged to understand themselves why and how something happened so they could report more extensively the commercial manager about any deviations.

The contract defined in detail multiple commercial issues. Firstly, it described required insurances and bank guarantees facilitating the commercial manager's job in ensuring and maintaining those. Similarly, taxes did not require significant work at the beginning, but after the legislation change, the commercial manager needed to establish

Results

tax procedures and ensure the tax compliance of the project. This required a cooperation with tax advisors and accounting in both offices to find optimal taxation strategy and to fulfill all requirements. On the contrary, different licenses and work permits required a significant amount of work and the commercial manager ensured that every relevant people could visit site with appropriate visa. Additionally, the commercial manager managed currency fluctuations which led to 2 M€ of additional revenue through hedging. All in all, the major task of the commercial manager was to interpret the contract and to transfer its requirements into different project functions and to manage the multientity configuration.

The change order process was well defined in the contract. However, the major work was required because of the extensive questioning and requiring from the management company the client had hired. The commercial manager initiated all changes and claims the case firm faced by starting the official process, managing the process, and signing all the invoices. Due to the existence of the site commercial manager, these tasks shifted to his responsibility once the construction started. It was stated that every project team member was responsible for reporting any potential changes. The commercial manager further evaluated benefits and commercial effects of these changes and presented potential ones for the client. Change orders were mostly initiated by the commercial manager at the beginning but later the responsibility transferred to the site commercial manager and leaving only checking and verifying proposals to the commercial manager.

In procurement, the commercial manager was not so involved. Still, the commercial manager, together with the project manager, checked and approved major invoices from suppliers and subcontractors. In addition, the commercial manager verified official letters to be send and participated in the problem-solving with subcontractors. The commercial manager assisted at the later phase of the project in all issues about taxation and importing, since the case firm tried to import all possible equipment in the name of the client to avoid duties and taxes.

In risk management, the project manager, commercial manager, and site commercial manager were responsible to jointly update the template and taking care of the provision. The input came from other functions, but they ensured that it was done

Results

properly, and right questions were asked to gather all relevant information. The template was updated at least once a year in a risk analysis meeting. Risk management was done extensively, and good mitigation plans were proposed to solve and diminish the effect of most of risks that arose during the project.

The commercial manager was needed extensively at the beginning of the project due to the understanding of the contract and the need to establish all procedures. However, the existence of the site commercial manager decreased the workload of the commercial manager at later phases. The responsibility for change and claim management and communication with the client was transferred to the site commercial manager. After that, only systematic processes like signing and processing invoices, verifications of letters and change orders, a budget and cash flow control, and reporting in monthly steering meetings were responsibilities of the commercial manager.

Summary

Commercial managers participated in all commercial management areas in case projects. However, there were differences on how this participation occurred. In Table 11, involvements of commercial managers from each case project for each commercial management area are presented to illustrate differences and similarities between case projects. Commercial management areas are the same than previously and what was introduced in Figure 5. In addition, the table summarizes key characteristics relating to the commercial manager of the project, including their educational backgrounds and mutual experience within project teams.

Results

Table 11: Key characteristics and involvements of the commercial manager in case projects.

	Educational Background	Project Team	Communication Management	Relationship Management	Cash Flow Management	Change and Claim Management	Procurement Management	Risk Management
Project 1	Mechanical Engineering	Well established	All written with client, Commercial reporting	Always involved, Supporting PM	Managed, Cost controller performed	Active, Success	No responsibilities, Supported in problem issues	Together with PM, All disciplines supported
Project 2	Technical & cost controlling	No previous experience	Contract-related communication, Commercial reporting	Minor role	Establish and did cost controlling	Inactive, Defensive	No responsibilities, Lack of support	Together with PM and EM, Did calculations
Project 3	Microeconomics	Consortium partner included, No previous experience	All written with client, Commercial reporting	Always involved, Supporting PM	Managed, Cost controller performed	Defending about claims	No responsibilities, Supported in problem issues	Together with PM, All disciplines supported
Project 4	Relations and business	No previous experience	Commercial communication, Commercial reporting	Commercial issues	Managed, Cost controller performed	Only necessary	No responsibilities, Supported in problem issues	Together with PM, All disciplines supported
Project 5	Relations and business	Multiple changes in core project team, No previous experience	Contract-related communication, Commercial reporting	Minor role due to site commercial manager	Managed, Cost controller performed	Active, Huge work	No responsibilities, Supported in problem issues	Together with PM and SCM, All disciplines supported

Risk and procurement management were organized very similarly in all case projects, implying more systematic habits of arranging and executing the work. Risk management was performed mutually by project managers and commercial managers. In addition, the engineering manager in one and the site commercial manager in another project were highly involved due to the technical complexity and the need of site expertise, respectively. Otherwise, all project functions were encouraged to participate and cooperate by providing an input from their field of expertise. In the procurement process, commercial managers were not involved, but they ensured that client contract requirements were converted into subcontracts and assisted in problem situations where commercial managers' contractual knowledge could be utilized.

Similarly, cash flow management was organized mostly in the same manner in all projects. Commercial managers were responsible for creating financial processes, for defining responsibilities between project roles and project entities, and for managing the process entirely. Cost controllers performed specific actions and reported about all deviations and other issues to commercial managers. Commercial managers, together with cost controllers, solved these issues, and project managers were involved in problem-solving only in very major issues. In one project, the arrangement was significantly different, as the commercial manager also performed cost controlling activities, reducing his focus on other commercial areas and, consequently, the success in those.

Results

In relationship management with the client, commercial managers tended to be an assisting contact person supporting project managers. In two projects, the role of the commercial manager was significantly smaller, but another of those was compensated with the site commercial manager who assisted the project manager. When commercial managers were highly participating in relationship management, project managers had the support they needed in observing, discussing, and developing relationship management practices. Communication management practices were quite similar throughout case projects since commercial managers performed at least the contract-related communication, and usually all written communication. Similarly, commercial reporting was the job of commercial managers in every project.

The major difference in commercial manager roles between case projects was in change and claim management. Each commercial manager had their own way to manage changes and claims. In addition, differed project characteristics, introduced in Table 9, affected how changes and claims could be performed. Some clients were very hesitant for any changes, and some of them were aggressively claiming the case firm leading to varied strategies from commercial managers. All in all, change and claim management needed to be executed in a transparent, proactive, and involving way with a strategy modified based on the client's habits. The client needed always to be aware about benefits from changes with enough back-up documentation. This timely and sufficient back-up documentation also facilitated in defending against claims from the client.

Educational backgrounds of commercial managers varied from technical to management and business knowledge. No legal education was found within case project's commercial managers. They all agreed that contracts, in fact, include a small portion of purely legal content for which knowledge could be covered with couple of legal courses. Thus, educational backgrounds were considered as sufficient for such a role. Instead, the project team and its cohesion were shown to be a major issue in performing commercial management. One project had a well-established project team which led to a successful and well-defined cooperation between key project roles. In other projects, the core project team was new for each other requiring more reconciliation of ways of working. In one project, this caused issues in trust and in the division of responsibilities between key roles.

Workloads of commercial managers were quite similar in all case projects. In general, the role was a full-time job with high workload throughout the project. There was a peak at the beginning as the contract needed to be reviewed and understood, and all commercial procedures needed to be established. In addition, creating invoices, tax and insurance handling, and cash flow calculations for risk analysis burdened commercial managers. At the procurement phase, the involvement was a bit more peaceful. When the site opened and construction begun, change and claim management increased the workload usually causing another peak. Commercial managers, together with project managers, were usually involved until the very end of the project.

4.4 Commercial manager's perceived involvement in case projects

Table 12 presents results from case projects about commercial managers' involvement levels in activities that the study of Lowe and Leiringer (2005) suggested as a job of the commercial manager. Results are derived from the second template filled in during each interview with responses with the scale given from 0 to 3. Columns present each project and the upper row presents the response from the project manager and the lower row from the commercial manager. Additionally, averages are presented for both roles and as total. A scale from 0 to 3 refers to involvement levels from none to high. Thus, an average close to three means a high involvement, an average between one and two refers to a medium involvement, and smaller than one means a very low involvement. A red-to-green coloring illustrates the intensity of the involvement level, where the high involvement is marked as green. Additionally, activities have been categorized further into four categories based on related project function.

Results

Table 12: Involvement levels of the commercial manager in commercial activities in case projects.

Category	Activity	Role	1	2	3	4	5	Average	Average
Contract Management	Contract Negotiation	PM	2	3	3	1	3	2,4	1,9
		CM	3	1	3	0	0	1,4	
	Contract Formulation	PM	3	3	2	1	2	2,2	1,8
		CM	3	1	3	0	0	1,4	
	Dispute Resolution	PM	3	3	2	2	3	2,6	2,6
		CM	3	1	3	3	3	2,6	
Bid Management	Bidding	PM	1	2	2	3	3	2,2	1,3
		CM	2	0	0	0	0	0,4	
	Procurement Strategy	PM	0	1	1	1	1	0,8	0,5
		CM	1	0	0	0	0	0,2	
	Price Formulation	PM	1	2	3	2	2	2	1,2
		CM	2	0	0	0	0	0,4	
	Creation of Outline Proposals	PM	2	2	1	1	1	1,4	0,8
		CM	1	0	0	0	0	0,2	
Financial Management	Cash Flow Management	PM	3	3	3	3	2	2,8	2,8
		CM	2	3	3	3	3	2,8	
	Cost Management	PM	1	3	3	2	1	2	2,3
		CM	1	3	3	3	3	2,6	
	Payments	PM	2	3	3	3	3	2,8	2,9
		CM	3	3	3	3	3	3	
	Cost Value Reconciliation	PM	3	2	3	2	1	2,2	2,5
		CM	2	3	3	3	3	2,8	
	Claim Formulation	PM	3	3	2	3	3	2,8	2,9
		CM	3	3	3	3	3	3	
Other	Risk Management	PM	2	3	3	3	2	2,6	2,7
		CM	2	3	3	3	3	2,8	
	Acquiring Approvals and Permits	PM	1	1	2	0	3	1,4	1,7
		CM	1	3	0	3	3	2	
	Value Management	PM	2	3	2	1	1	1,8	2,2
		CM	2	2	3	3	3	2,6	
	Sub-Contractor / Supplier Administration	PM	3	2	2	0	1	1,6	1,4
		CM	1	3	0	1	1	1,2	

PM = Project manager; CM = Commercial manager; 1 = Project 1; 2 = Project 2; 3 = Project 3; 4 = Project 4; 5 = Project 5

In the case firm, commercial managers were mostly responsible for financial management, including cash flow management, cost management, payments, cost value reconciliation, and claim formulation, as each of those activities received an average over 2,3. Risk management and dispute resolution were other highly involved activities. In these activities, there were only minor differences between and within projects. Cost

Results

management was rated with a low involvement in one project leading to a bit lower rating than other financial management activities. As a result, commercial managers were highly and comprehensively involved in financial management of projects.

Clearly the least involvement was found within all bid management activities, such as, bidding, procurement strategy, price formulation, and creation of outline proposals. Commercial managers did not involve extensively in the sales phase thus did not contribute these pre-contract activities. Project managers believed that commercial managers contributed moderately even though they themselves experienced close to no involvement at all. This might be caused by different expectations and a miscommunication on the need of commercial managers' in sales phase activities. They were expected to involve more but for some reason they did not involve as expected. A similar finding was seen in contract formulation and negotiation activities that are later parts of the sales phase. The perceived involvement was higher, but again project managers saw more involvement than commercial managers themselves. However, most of the difference was caused by two none responses, which were from the same commercial manager. Therefore, an individual bias might have a high impact here.

In Other category, excluding the risk management, more differentiation between projects was found. This illustrated how activities and responsibilities of the commercial manager varied from project to project. Answers varied from 0 to 3 and the difference can be seen between projects and respondents. As a result, these activities were organized very differently in each project or respondents interpreted these activities a bit differently causing so much variation in responses. In average, the involvement in these activities was medium, but as mentioned, both high and no involvement were found.

Additional activities that were highlighted by multiple respondents include insurances, reporting, invoicing, taxes, multientity management, and establishing permanent establishment or consortium for the project. Those activities are presented in Table 13 with the frequency of mentions for each activity. As already mentioned in project descriptions, commercial managers performed insurance, tax, and currency management in all projects. In addition, reporting, especially about commercial topics,

Results

in project, client, and steering meetings was mostly the responsibility of commercial managers. Commercial managers were also participating in invoicing at least by confirming and verifying invoices sent to the client. Furthermore, commercial managers were usually responsible for establishing the project setup, whether it required permanent establishment, consortium, or cooperation of multiple entities of the case firm. There is no reason to compare proposed additional activities between respondents and projects since some respondents were more eager to propose additional activities and others clearly did not think it as thoroughly.

Table 13: Additional activities that multiple commercial and project managers highlighted.

Insurances	5
Reporting	4
Invoicing	3
Taxes	3
Multientity Management	3
Establishing PE / Consortium	2

Table 14 presents perspectives of project managers, commercial managers, and introduces the perspective from line managers about the commercial manager role. Responses from project managers and commercial managers were project specific but responses from line managers were not related to any specific project. A scale is the same 0 to 3 than previously and the table presents averages within each of three respondent group for each activity. Additional activities highlighted by commercial managers and project managers from Table 13 were included in this version of the template. Again, a red-to-green scale illustrates results with a green color highlighting activities where the high involvement is expected.

Table 14: Expectations of the involvement of the commercial manager in commercial activities from three perspectives.

Category	Activity	Project Managers	Commercial Managers	Line Managers*
Contract Management	Contract Negotiation	2,4	1,4	1,6
	Contract Formulation	2,2	1,4	1,8
	Dispute Resolution	2,6	2,6	3
Bid Management	Bidding	2,2	0,4	1,8
	Procurement Strategy	0,8	0,2	1,6
	Price Formulation	2	0,4	1,6
	Creation of Outline Proposals	1,4	0,2	1,2
Financial Management	Cash Flow Management	2,8	2,8	2,4
	Cost Management	2	2,6	2,6
	Payments	2,8	3	2,8
	Cost Value Reconciliation	2,2	2,8	2,6
	Claim Formulation	2,8	3	3
Other	Risk Management	2,6	2,8	2,8
	Acquiring Approvals and Permits	1,4	2	1,2
	Value Management	1,8	2,6	1,6
	Sub-Contractor / Supplier Administration	1,6	1,2	1,4
Additional activities mentioned by commercial and project managers	Insurances	-	-	3
	Reporting	-	-	3
	Invoicing	-	-	2,8
	Taxes	-	-	3
	Multientity Management	-	-	2,4
	Establishing PE / Consortium	-	-	2,4

*not project-specific responses

The view of line managers followed quite well previously described views of project managers and commercial managers. Financial management, risk management, and dispute resolution were similarly highly required. In bid management, line managers saw the role of commercial managers similarly to project managers, which was significantly higher compared to commercial managers. Thus, there was found an issue that the actual involvement of commercial managers did not meet expectations in this project phase. In another major difference, contract management, line managers' view placed the involvement level in between views from commercial managers and project

Results

managers. The situation might be similar that expectations from the commercial manager were higher than their actual involvement. On the contrary, in value management and acquiring approvals and permits the situation was reversed, and commercial managers involved more than expected from them. In addition, line managers agreed on all additional activities that were introduced in Table 13 with an average response over 2,4 meaning the high involvement was expected.

Summary

To conclude, the role of the commercial manager was to ensure that financials of the project were managed, to collect and consolidate information from different functions of the project, and to manage the client contract and transfer its requirements to relevant functions. This included managing and verifying major cash flows, establishing commercial project procedures and project setup, and managing all issues related to the contract, such as, change and claim management and negotiations with the client. In addition, the commercial manager supported the project manager in communication, especially in written one, client relationship, and risk management.

The use of the role has diminished over time and some good practices has been forgotten. Therefore, the role has diverged based on the person performing it. As a result, more standardization is needed, and official procedures needs to be established. For example, a higher involvement was expected in sales phase activities, such as contract and bid management, than was realized. Additionally, there were very project related activities. Acquiring approvals, multientity management, establishment of the project setup, currency, and tax management were activities whose relevance was strongly defined by project characteristics, introduced earlier in Table 9.

4.5 Commercial management in reference projects without commercial manager

Three projects that were implemented in the case firm's Finland entity were selected to be studied as reference projects to show how commercial management has been organized without an appointed commercial manager role. Projects were selected to have different project managers and different commercial characteristics. They were

Results

introduced in Table 6. The first project was from the other business unit of the case firm delivering a plant to a Turkish client with an EPS contract of 18 M€. The second project was a major equipment delivery project for a Finnish client provided with an EPS contract with the value of 35 M€. The third project was part of a larger venture providing a capacity upgrade on a plant in Norway through a bundled equipment delivery worth of 16 M€.

In communicating with the client and building the relationship, project managers were contact persons in all projects. Both oral and written communications were performed by project managers including technical and commercial topics. Change and claim management in each project were mostly performed by project managers. Each project had clear procedures for change order requests. In addition, a long relationship with one of the clients and another client being a local client, facilitated the job of project managers. In ambiguous issues, project managers consulted the sales team and the contract management department to receive insights on agreed issues in the sales phase and support on legal documentation. The contract management department was also consulted to ensure that all contract terms and conditions were transferred to sub-contracts. Additionally, project managers utilized knowledge of the technical people responsible for the product or the equipment package for the back-up documentation and argumentation. Otherwise, project managers, with the support from specialists, prepared, negotiated, and finalized all change order requests and claims.

Project managers were mostly responsible for other commercial issues also like cash flow, invoicing, taxes, bank guarantees, and insurances. In each topic, however, different support functions were involved to collect all required knowledge to perform the action. In taxation, human resources and tax departments were closely worked with to find the optimal solution which project managers verified and signed. Insurances were as well managed mostly by other function, the compliance department in this case, and project managers mostly helped and signed decisions. Bank guarantees were easily managed, and project managers did all changes to those. For invoices, project managers had a high responsibility in each project in monitoring that invoices were sent as soon as possible to receive money earlier. This was considered as a major activity that required focus from project managers. Cash flow management was in the responsibility

Results

of project managers, but project controllers performed most activities, such as inputting figures to the system and reporting about any deviations to project managers. In one project, the project controller had clearly a higher responsibility, comparable to the commercial manager, requiring the project manager's involvement only in major issues.

Project managers found most difficulties in understanding and producing legal language for contractual correspondence. Therefore, the contract management department and salespersons were frequently utilized in all projects. Managing commercial issues like invoices were found feasible within project managers. However, taxes and insurances were mostly handled by other support functions of the case firm requiring only a signature from project managers. Project managers perceived that they could have been focusing more on managing the entire project rather than performing these specific topics if a commercial manager would have been appointed for the project. In addition, they could have gone, even more extensively, to see the client on site. Finally, it would have been beneficial if all these commercial activities were handled inside the project to ensure a more extensive understanding about the project context.

4.6 Commercial manager's impact on project performance

In this thesis, the project performance is reviewed by the number of change orders, their profitability, and the general margin development within the project. The statistical research through 42 projects provides following quantitative analyses. At the beginning, it was acknowledged that the small sample size will limit the significance and the reliability of quantitative results. However, the designed model functions as a reference how to execute such an analysis when the sample will be more feasible. Therefore, the model presents a basis on top of which further research can be established. Additionally, further variables and metrics are proposed that might increase the validity of the model but could not be included yet in this model.

Regression analysis

Regression tables for each selected metric are presented in Table 15, 16, and 17. Tables shows that the coefficient for the commercial manager was positive in the amount of

Results

change orders and their profitability. In more detail, the existence of the commercial manager seemed to increase the proportional amount of change orders by 8 % of the contract value, and profits from change orders by 257 k€. On the contrary, the coefficient for the margin development suggested a negative effect of 2 518 k€.

Table 15: The regression table for the proportional amount of change orders

Regression Statistics						
Multiple R	0,5048					
R Square	0,2548					
Adjusted R Square	0,0144					
Standard Error	0,2301					
Observations	42					
ANOVA						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	10	0,5614	0,0561	1,0601	0,4204	
Residual	31	1,6416	0,0530			
Total	41	2,2029				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-0,1518	0,3332	-0,4557	0,6518	-0,8313	0,5277
Commercial Manager	0,0836	0,1739	0,4805	0,6342	-0,2711	0,4382
BL A	-0,0643	0,1112	-0,5784	0,5672	-0,2911	0,1625
BL B	-0,0101	0,3144	-0,0323	0,9745	-0,6514	0,6311
BL C	-0,1922	0,3437	-0,5592	0,5800	-0,8933	0,5088
BL D	-0,1506	0,2808	-0,5363	0,5956	-0,7233	0,4221
Germany	-0,1783	0,1383	-1,2888	0,2070	-0,4605	0,1038
Finland	0,0706	0,2427	0,2909	0,7731	-0,4244	0,5656
New in	0,0341	0,0171	1,9961	0,0548	-0,0007	0,0689
Contract Type	0,0142	0,1035	0,1367	0,8921	-0,1970	0,2253
Contract Value	0,0000	0,0000	1,0032	0,3236	0,0000	0,0000

Results

Table 16: The regression table for the change order profitability.

Regression Statistics						
Multiple R	0,6323					
R Square	0,3998					
Adjusted R Square	0,2062					
Standard Error	3036,94					
Observations	42					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	10	190475815	19047582	2,0652	0,0598	
Residual	31	285913931	9223030			
Total	41	476389746				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-1513,94	4396,84	-0,3443	0,7329	-10481,35	7453,47
Commercial Manager	256,96	2294,95	0,1120	0,9116	-4423,63	4937,55
BL A	-2114,06	1467,58	-1,4405	0,1597	-5107,19	879,08
BL B	-3946,86	4149,29	-0,9512	0,3489	-12409,40	4515,68
BL C	-5134,70	4536,44	-1,1319	0,2664	-14386,82	4117,42
BL D	-4024,21	3705,87	-1,0859	0,2859	-11582,38	3533,96
Germany	-866,32	1825,76	-0,4745	0,6385	-4589,97	2857,33
Finland	2,77	3202,99	0,0009	0,9993	-6529,77	6535,31
New in	240,98	225,39	1,0692	0,2932	-218,71	700,67
Contract Type	883,38	1366,58	0,6464	0,5228	-1903,79	3670,55
Contract Value	0,03	0,01	2,6845	0,0116	0,01	0,05

Table 17: The regression table for the margin development.

Regression Statistics						
Multiple R	0,6653					
R Square	0,4426					
Adjusted R Square	0,2627					
Standard Error	7014,21					
Observations	42					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	10	1210853596	121085360	2,4611	0,0268	
Residual	31	1525175313	49199204			
Total	41	2736028909				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	6801,04	10155,06	0,6697	0,5080	-13910,34	27512,42
Commercial Manager	-2518,47	5300,49	-0,4751	0,6380	-13328,89	8291,96
BL A	-3975,13	3389,55	-1,1728	0,2498	-10888,17	2937,92
BL B	1910,29	9583,33	0,1993	0,8433	-17635,03	21455,62
BL C	-8552,41	10477,48	-0,8163	0,4206	-29921,37	12816,56
BL D	-11530,02	8559,18	-1,3471	0,1877	-28986,59	5926,55
Germany	672,18	4216,82	0,1594	0,8744	-7928,08	9272,43
Finland	1226,01	7397,71	0,1657	0,8694	-13861,73	16313,75
New in	-264,17	520,57	-0,5075	0,6154	-1325,88	797,55
Contract Type	-822,74	3156,30	-0,2607	0,7961	-7260,07	5614,58
Contract Value	0,01	0,03	0,4618	0,6474	-0,04	0,07

Results

All coefficients for the existence of the commercial manager had far from significant p-values: 0,63, 0,91, and 0,64, respectively. When the limit for statistical significance was $p < 0,05$, it can be concluded that results did not fulfill the requirement and therefore no further conclusions could be made from coefficients. The reason for such a low significance lied in the fact that commercial managers had mostly been used in only one delivery unit, and in three business lines. This caused high multicollinearity issues since Variance Inflation Factor values highly exceeded 10. This was due to the independent variable, the existence of the commercial manager, not spreading over the project population. The high multicollinearity together with the relatively small sample size of 42 projects made it impossible to differentiate whether the effect was from the commercial manager or from these other variables with a high multicollinearity, for example, Germany as a delivery unit or BL B and BL C as a business line.

Furthermore, the complexity of selected metrics and limitations with selecting variables, complicated the possibility to establish a model describing the phenomenon extensively. R square values of regression models varied from 0,25 to 0,44, meaning that only less than a half of the variation in metrics were described by variables included in the model. As a result, there were a high number of factors affecting metrics that was not included in the model. For example, the maturity of the technology, market area, previous relationship with the client, cooperativeness of the client, length of the project execution, risk category, and key project personnel were such factors that have an impact on selected metrics but could not be included in the model due to availability issues of the data or the complexity to quantify the variable.

Average-based analysis

To further analyze the effect of the commercial manager and differentiate it from variables with a high multicollinearity, an additional analysis from averages in each variable is presented in Table 18. Similarly to the regression analysis, these averages are only referential because of the small sample size. The table presents each dummy variable and averages of projects included in that variable in all metrics. The portion of projects with the commercial manager is highlighted with an increased gray coloring. A red-to-green scale illustrates where the best, and the worst, performance lied.

Table 18: The average-based analysis in selected metrics for each variable.

Variable	Portion of CM Projects	Amount of Change Orders (%)	Profitability of Change Orders (k€)	Margin Development (k€)
Existence of Commercial Manager				
CM	All	6 %	-92	-14
non-CM	None	13 %	1370	278
Delivery Unit				
Finland	None	16 %	2058	2904
Germany	All	2 %	-213	753
Other	Medium	7 %	-350	-5228
Business Line				
BL A	Low	12 %	1188	1114
BL B	All	9 %	-48	3902
BL C	All	3 %	-262	-7265
BL D	Medium	0 %	-636	-8714
BL E	None	20 %	3105	5366
Contract Type				
EPC	High	4 %	1129	-2123
EPS	Low	12 %	639	1156

CM = Commercial Manager

The table shows that projects with commercial manager had succeeded worse in each metrics than projects without one. Furthermore, the difference was relatively noticeable in all metrics, especially in ones relating to change orders. As a result, projects with commercial manager had performed worse based on selected metrics. But as mentioned, this do not explicitly mean that the commercial manager was the reason for this. For example, a self-selection bias of utilizing commercial managers only in more challenging projects affected results.

There were commercial managers in every project that had been implemented through the Germany delivery unit. In addition, approximately one-third of projects led by Other delivery units had had the commercial manager, and none in Finnish-led projects. Finland, as a delivery unit, had the best performance throughout all selected metrics with a significant lead. The mutual order of Germany and Other delivery units varied based on the metrics. As a result, commercial managers had been utilized especially in projects in delivery units where the project performance was not as high as in other units.

Results

When focusing on business lines, the similar finding was even more noticeable. Commercial managers had not been involved in projects in two generally best performed business lines, BL E and BL A. Instead, commercial managers had a high participation rate in worse performing business lines, BL B, BL C, and BL D, where especially the latter two had the lowest performance scores throughout metrics. These business lines had a lower performance throughout the project portfolio of the case firm, no matter whether the commercial manager was involved. Again, it appeared that the commercial manager role had been utilized in projects that had, in principle, a lower performance to begin with.

The complexity of the contract type showed a better performance of EPS projects in the amount of change orders and the margin development compared to EPC projects. On the contrary, EPC projects had succeeded better with the profitability of change orders. Due to the higher level of complexity, EPC projects had higher portion of projects with the commercial manager, introducing one example of the self-selecting bias within the project portfolio. Even though the finding was not in this case so obvious, it was seen how the group having a higher portion of projects with the commercial manager, had succeeded less in selected metrics.

Variables that had a higher portion of projects with the commercial manager, had lower performance in selected metrics. However, some attributes, such as, business line and contract type, seemed to have more consistently lower performance no matter whether they had the commercial manager. Therefore, it seemed like these attributes caused more the lower performance than the existence of the commercial manager. Delivery unit, instead, was more complicated and could not be concluded whether the delivery unit or the commercial manager had a bigger effect. To conclude, the commercial manager had been utilized in projects that had other attributes that decreased the performance in selected metrics. Therefore, it could not be stated that the commercial manager was the reason for the lower performance. For example, the self-selection bias causing the commercial manager to be used in more complex projects, or projects with more demanding and challenging client, might cause the lower performance, even though the success would have been even lower if the commercial manager was contributing in project execution.

Developing a rigor model

The introduced model lays the foundation for exploring project performance implications of the appointed commercial manager. However, limitations within available data narrowed down possibilities to develop a model to describe the variation more extensively within key metrics. Therefore, R square values remained relatively small. Based on qualitative findings, following variables need to be defined, monitored, and updated accordingly as a project data to develop the model. The maturity of the technology, the market area or even the country, the previous relationship with the client, the cooperativeness of the client, the length of project execution, the risk category, and the key project personnel are such factors that would improve the model and its ability to describe the variation in key metrics. This would either require collecting such information or designing a way to quantify the variable in a way that it could be included in the statistical model.

Selected metrics had some validity issues in measuring the commercial performance. Individually, these metrics had a limitation in measuring the performance since a project with less change orders can be commercially much more successful than a project with a higher amount of change orders. In other words, selected metrics cannot alone be used to incentivize project people to aim for as high amount of change orders as possible, no matter about other key metrics. Instead of comparing projects as individuals, metrics were introduced to evaluate projects in a portfolio level and to be evaluated together as a set of metrics. As a result, they provided a general overview about change order habits, including the amount of change orders and their profitability, as well as the project execution through the margin development.

To evaluate the commercial success of projects in project level, following metrics are introduced. They were developed with the help from metrics presented by Gransberg et al. (1999) for partnering. Modifications to the existing list of metrics derived from findings about how commercial activities could be measured in five case projects that were qualitatively studied. Firstly, the emphasis is more on profits than costs due to the nature of the goal of commercial management in both increased sales and decreased costs. Secondly, the success in claiming, in addition to their costs, is highlighted from

both schedule and costs perspectives. As a result, Table 19 presents proposed relevant key performance indicators for measuring the success of commercial management.

Table 19: Proposed key performance indicators for measuring the success of commercial management of a project.

$$\begin{aligned} \text{Original Margin} &= \frac{\text{Original Contract Value} - \text{Original Costs}}{\text{Original Contract Value}} & (1) \\ \text{Additional Sales (Change Orders)} &= \frac{\text{Final Contract Value} - \text{Original Contract Value}}{\text{Original Contract Value}} & (2) \\ \text{Average Value per Change Order} &= \frac{\text{Final Contract Value} - \text{Original Contract Value}}{\text{Number of Change Orders}} & (3) \\ \text{Margin of Change Orders} &= \frac{\text{Additional Sales} - \text{Costs of Additional Sales}}{\text{Additional Sales}} & (4) \\ \text{Profitability of Change Orders} &= \frac{\text{Margin of Change Orders}}{\text{Original Margin}} & (5) \\ \text{Uncharged Time Extension} &= \frac{\text{Total Days Executed} - (\text{Total Days Allowed} + \text{Additional Days Granted})}{\text{Total Days Allowed} + \text{Additional Days Granted}} & (6) \\ \text{Percentage of Additional Days Claimed} &= \frac{\text{Additional Days Granted}}{\text{Total Days Executed} - \text{Total Days Allowed}} & (7) \\ \text{Costs of Liquidated Damages} &= \frac{\text{Liquidated Damages Cost}}{\text{Total Contract Cost}} & (8) \\ \text{Costs of Claims} &= \frac{\text{Total Cost of Claims}}{\text{Original Contract Cost}} & (9) \\ \text{Costs of Disputes} &= \frac{\text{Total Cost of Disputes}}{\text{Original Contract Cost}} & (10) \end{aligned}$$

These metrics concern how effectively beneficial changes have been negotiated with the client and how well issues in the project have been covered with time extensions and claims to the client. First five metrics (1-5) refer to the successfulness of change orders by evaluating their total amount, average value, margin, and margin in relation to the general project margin. These metrics evaluate comprehensively how beneficial change orders have been for the project. Following two metrics (6-7) evaluate time extensions for the project. They monitor how much of time extensions is paid by the case firm itself and how big share about all time extensions are negotiated to get paid by the client. Last metrics (8-10) include costs of liquidated damages and claims that the firm has agreed with the client and subcontractors and costs of all disputes and other disagreement solving.

5 Discussion

Chapter 5 discusses the main contribution of the thesis. Firstly, results are analyzed more comprehensively to provide concluding words for the thesis and to address to research questions. Secondly, practical implications for the case firm are introduced, referring to how the case firm can elaborate on results of the research and utilize those in their business. Thirdly, the contribution to existing academic knowledge is introduced. Finally, limitations for the study are presented, and topics for further research to confirm and deepen results gathered in this study are proposed.

5.1 Conclusions

To support the global launch of the commercial manager role throughout different delivery locations of a project supplier firm, the commercial manager role needs to be standardized and clarified. In the case firm, the commercial managers' role in project execution has varied, complicating a wide and consistent role implementation. On the other hand, the empirical study suggests that specific project characteristics, such as the country and the client, require flexibility in the role description. This applies especially in change and claim management, but also in taxes, currencies, regulations and legislation, work and other permits, multi-entity management, and project setup. These differences emerged also the need to establish derived commercial procedures for the project. All in all, the role shall be well-defined with a sufficient flexibility to cope with different projects executed in different locations and having specific characteristics. This is valid also for commercial procedures. These need to be well established by adequate process descriptions and instructions but also to be easily modifiable to meet different requirements of projects.

The study suggested that commercial management, as such a holistic discipline, is participated by all core project management roles: project manager, commercial manager, engineering manager, procurement manager, cost controller, and scheduler. Commercial manager was considered as an integrator, while an input and involvement were found from those other roles. Project manager shared the responsibility with commercial manager about all commercial management areas. Engineering manager

participated strongly in all areas except cash flow management due to the technology expertise. Procurement manager was highly involved in procurement and provided medium support in risk, change, and claim management. Project controller and scheduler showed similar medium involvement providing input about cost and schedule estimates for procurement, risk, change, claim, and especially cash flow management. As a result, commercial management takes place as cooperation between commercial manager and respective functional managers.

Empirical research showed that most major commercial issues in the case firm's project execution were related to local requirements and legislation, inadequate and unfavorable contract terms and conditions, and the demanding client together with reactive change and claim management from commercial manager. Commercial manager can overcome these challenges by utilizing and integrating local knowledge and expertise more extensively and by involving him/herself more in the sales phase together with project manager. In addition, consistent change and claim procedures need to be established to integrate all functions, and to increase efforts for a good relationship with the client through early, honest, and transparent information sharing and documentation.

Establishing a cohesive and well-functioning project team was referred as a positive factor in achieving commercial success. Commercial manager and project manager need to build a team with a clear cooperation pattern and responsibilities without collusions between personal chemistry and preferences. Major differences in involvement levels of commercial managers between case projects were exposed in relationship, change, and claim management. Commercial manager is expected to support project manager in client meetings to have two perspectives in the client interface. In change and claim management, commercial manager must be active, transparent, early with communication, and precise with documentation engaging all project functions. Finally, the cooperation between commercial manager and cost controllers in financial management needs to be well established, to avoid commercial manager interfering deeply in cost control activities, thus neglecting his/her major responsibilities.

Discussion

Based on empirical observations, core activities of commercial manager in the case firm were financial management, risk management, change and claim management, and dispute resolution. The involvement in the sales phase and bid management was vague, even non-existent, compared to higher expectations of project managers and line managers. Other activities of commercial manager comprised, for example, acquiring approvals and permits, value management, subcontractor and supplier administration, reporting, invoicing, insurance, tax and currency handling, multi-entity management, and establishing permanent establishment or consortium. Educational and professional backgrounds of commercial managers lying in technical, managerial, and business knowhow was fulfilling requirements of the role and competences identified in the literature.

The involvement of commercial manager was full-time work throughout case projects. Major peaks in the involvement occurred in the early phase and the site phase of the project. At the early phase, the contract shall be read, understood, and converted into internal requirements, and project procedures need to be established. The site phase peak was a result of the construction start-up triggering change and claim management. As a result, the high workload, especially at those peaks, needs to be estimated and other responsibilities shall not be assigned to commercial manager to distract the focus away from the core role.

Project managers agreed that in such a major project, commercial manager's presence is essential for successful project execution. Additionally, they agreed that smaller projects need to also have an appointed commercial manager, at least in a consultative role, for commercial issues. The client, country, and contract type were suggested as most significant factors justifying the presence of commercial manager. Conclusion from interviews was that appointing a commercial manager would be beneficial in all projects, even though the role would be different in minor projects.

To conclude, assigning a commercial manager has three-fold benefits in project execution based on both case and reference projects. Firstly, it enables project manager to focus more on holistic project management rather than just executing specific tasks. This is especially important in major projects where managing multiple disciplines and

project stakeholders is time consuming. Secondly, it enables knowhow to be retained and be utilized within the project. In projects with commercial activities as project manager's duty, external functions, such as sales and contract departments, were usually engaged to resolve complicated issues. However, they lacked appropriate inside project information and knowledge. In addition, non-existence of these support functions in some delivery locations, forces the functional expertise to be included in the project. Finally, it enabled improved performance in commercial activities due to deep specialization of one person. However, these benefits are achievable if the role is well defined and consistently executed in each project to ensure consistent division of work between key roles and effective cooperation between project parties.

Conclusions based on direct correlation between the commercial manager existence and financial performance of selected projects cannot be drawn. Other project characteristics, such as business line and risk category, have an impact but small project sample of 42 projects could not identify relative effect of those. It is beneficial for the case firm to monitor introduced metrics to understand the commercial success of projects. An example of this is how changes are converted into additional sales, profit, and cash flow. Commercial manager mostly impacts on how different kind of changes are embedded in the contract, and consequently, how the firm got additionally paid. Thus, proposed metrics relate mostly on change orders, but as well on effectiveness of other negotiable factors, such as claims and liquidated damages.

Even though metrics to analyze the success of commercial management are predominantly financial, the effect of commercial management throughout the success dimensions is arguable. In the five-dimensional success framework, proposed by Shenhar and Dvir (2007), and introduced in Chapter 2.3, the business and direct success concerns mostly those financial metrics where commercial management is highly associated. Based on case project observations, effectively organized commercial management can, however, contribute also in other success dimensions. Project efficiency dimension is improved by effective change and claim management helping to meet schedule and budget since changes are more consistently agreed with the client. Impact on customer dimension is enhanced by an intensified customer relationship and negotiated beneficial changes meeting customer requirements and specifications.

Discussion

Impact on team dimension, is improved by a successful team mobilization and a facilitation of collaboration. Finally, preparing for future dimension benefits from more emphasis on a project life cycle creating potential for additional sales for the same client and further business opportunities with other industry sector player in that market area.

Table 20 summarizes above described observations from the empirical analysis and, subsequently, conclusions that has been drawn based on them. The total of 14 conclusion statements highlight major findings of the empirical research of case projects. Statements are categorized whether they relate to commercial issues in project execution, need for the commercial manager, the commercial manager role, or performance implications of commercial manager. Proposed conclusion statements provide a starting point for further research for the case firm or academic society.

Table 20: Major observations and conclusion statements of the thesis.

	Category	Observations from empirical analysis	Conclusions
1	Commercial issues in project execution	Lack of knowledge regarding local requirements and legislation caused issues during project execution	A more thorough market analysis during the sales phase and utilization of local knowledge and expertise in project execution is required
2.1		Inadequate and unfavorable contract terms and conditions caused issues during project execution	A more extensive involvement from commercial manager and project manager in the sales phase is required to exploit their project execution knowledge
2.2		Decent involvement in the sales phase was expected and its importance was acknowledged but it was not realized	
3		Unsuccessful change and claim management deteriorated project margins	A proactive and transparent approach in change and claim management is required to intensify the client relationship and to improve argumentation for changes
4	Need for the commercial manager	Commercial manager is required in each major project, while the client, country, and contract type were considered as most significant factors emerging the need	A fulltime commercial manager role is required in major projects while minor and less complex projects require another setup
5		The technology, country, client, contract, and participating units affected the role and the success of commercial management	An universal role description needs be designed with sufficient flexibility to adapt to these various project characteristics
6		Project managers handled most of commercial activities in reference projects, extensively utilizing support functions	Commercial manager would enable project manager to focus on holistic managing, decrease the dependence on support functions, and increase internal project knowledge in commercial topics
7	The commercial manager role	Commercial manager was a central integrator in commercial management, while all main project functions were involved and provided input	Cooperation between project functions needs to be supported for effective commercial management highlighting the importance of establishing a cohesive project team
8		Core activities of commercial manager were financial management, change and claim management, dispute resolution, risk management, and correspondence management	Commercial managers must have clear responsibility and empowerment for these activities and clarified requirements for inputs from other functions
9		Commercial manager shall support in reporting, invoicing, value management, approvals, procurement, bid management, and sales phase contract management	Expected input from commercial manager needs to be defined and in which cases and how it should be provided
10		Differences in commercial manager's role were related to correspondence, relationship, financial, and especially change and claim management	Clarification is required to define responsibilities and divisions of work through a standard role description
11		Full-time involvement from commercial manager was required in major projects, which peaked at the beginning and at the site phase	Commercial manager's workload needs to be estimated with no additional responsibilities in major projects while the involvement level in minor or less complex projects require further studying
12		Background of commercial managers varied from technical to management and business education	Backgrounds were suggested as sufficient, since legal background was not required, fulfilling the basis for required competences
13	Performance of projects with the commercial manager	Projects with commercial manager appeared to have lower performance in selected metrics, even though not being statistically significant	Further research is required, due to an occurred self-selection bias of commercial managers having been used only in one delivery unit, in couple of business lines, and in complex projects
14		Commercial manager, and in general effective commercial management, was expected to have its effect on the client interface and financial success of the project	Proposed commercial metrics monitor how project changes have been negotiated to get paid from, and how much respective costs have been generated for the firm

5.2 Practical implications

For the case firm, the empirical research provides supportive information on how the role can be implemented in project delivery units except Germany. By presenting comprehensive project stories, issues arisen commercially are highlighted to help extensively understand the phenomenon. Furthermore, expectations from both project managers and line managers differed compared to views of commercial managers. Topics where information disparity occurred, in other words, commercial managers did not meet all expectations, can be used for further discussion and clarification. This provides information for the case firm about the differences between role implementation habits and their impact on project execution. Major observations of the thesis were presented in Table 20 to present for the case firm underlying issues of the commercial manager role. Furthermore, conclusion statements based on those observations were proposed to support the global role implementation.

This thesis proposes a role description for the commercial manager role of the case firm, which is presented in Table 21. Activities that commercial manager needs to perform during project execution are listed. Activities are categorized under Responsible and Supporting categories, based on the level of involvement and responsibility assigned to commercial manager. Thus, activities under Responsible category are the ones that commercial manager takes the lead on. Correspondingly, Supporting category refers to activities that commercial manager assists in and provides an input to other parties to complete the activity. In addition, activities are categorized similarly to previous Results section into contract, bid, financial management, and other categories. The role description table presents the main cooperation role for each activity. Cooperative roles support commercial manager in activities under his responsibility and are responsible for activities in supporting category. Results are derived from templates filled in each interview and from qualitative findings from interviews.

Table 21: A proposition of the role description for the commercial manager role.

Role	Category	Activity	Cooperative Role
Responsible	Contract Management	Change Order Formulation	Project Manager
		Change Order Negotiation	Project Manager
		Claim Formulation	Project Manager
		Establishing PE / Consortium	Project Manager
	Financial Management	Cash Flow Management	Project Controller
		Payments	Invoicing
		Cost Management	Project Controller
		Cost Value Reconciliation	Project Manager
		Invoicing	Invoicing
		Taxes	Tax Advisors
		Currency	Finance & Control
	Other	Risk Management	Project Manager
		Reporting	All Disciplines
		Correspondence Management	Project Manager
		Insurances	Finance & Control
		Deputy for Project Manager	Project Manager
		Multientity Management	Project Manager
		Establishing Project Team	Project Manager
Supporting	Bid Management	Bidding	Sales
		Procurement Strategy	Sales, Supply
		Price Formulation	Sales
		Creation of Outline Proposals	Sales
	Contract Management	Dispute Resolution	Project Manager
		Contract Negotiation	Sales
		Contract Formulation	Contract Management
	Other	Sub-Contractor Administration	Procurement Manager
		Value Management	Project Manager
		Approvals and Permits	Local Advisors

Commercial manager is responsible for all financial management activities within the project. This comprises managing cash flow, invoicing, payments, costs, taxes, currency fluctuations, and bank guarantees. A major task is to establish prerequisites for cost controlling such as milestones, down payments, and cash planning. Commercial manager mostly manages above activities, while project controllers and invoicing team perform them. This includes entering budget and forecast figures, monitoring changes and deviations from budget, and sending and following up invoices. In major and most complicated issues, project manager is additionally involved in problem-solving.

Discussion

In contract management, commercial manager is responsible for activities during the project execution. This includes change orders and claims that needs to be formulated and negotiated with the client. In addition, commercial manager ensures that sufficient documentation and argumentation exist. In managing the relationship with the client and, for example, dispute resolution, commercial manager shall extensively support project manager, usually the primary client contact person in the case firm. The contract is already established in sales phase and commercial manager's role is purely supportive by providing knowledge from execution point-of-view for optimal contract quality. However, it appeared that this involvement is lacking but acknowledged as beneficial. After the contract is signed and received by the project team, commercial manager is responsible for a thorough analysis of the contract to ensure its completeness, correctness, and compliance with all function's requirements. In projects with specific setup, such as, multientity and permanent establishment, commercial manager is highly involved together with project manager in establishing and leading the setup. This includes defining procedures, responsibilities, and cooperation model between each project party and entity.

The involvement of commercial manager in bid management activities equals that in pre-sales contract activities. Commercial manager, together with project manager, needs to be involved to support sales team and ensure that accumulated knowledge and experience in project execution is considered already in the sales phase. This is valid for all bid related activities, including bidding, price formulation, procurement strategy, and creation of outline proposals.

The rest of activities with commercial manager in a significant role have been grouped under Other category. Firstly, risk management is performed together with project manager to jointly ensure all project functions' contribution. This comprises frequent initiating, monitoring, updating, and risk provision releasing. Additionally, commercial manager is responsible for written communication due to his/her contract knowledge thus correspondence management is essential for this role. In the case firm, reporting was one of key activities of commercial manager. Derived from the financial responsibility, commercial manager is in charge of commercial reporting for the client, project team, and steering committee. Furthermore, commercial manager supports

procurement in emerging contractual and financial issues with suppliers and sub-contractors. Additionally, commercial manager ensures that insurances, permits, and approvals are handled for fluent and safe access to the project site for relevant parties. Finally, commercial manager, together with project manager, establishes the project team and arranges a kick-off meeting. In a successful project, tight cohesion and efficient cooperation of the core team is vital.

The case firm can utilize the proposed role description to illustrate and define the role for the global launch. In addition, proposed metrics in Table 19 can be applied to further monitor how effective commercial management in fact correlates with project success. These propositions act as basis for further role development. They can be utilized to communicate the role description to existing commercial managers in German unit and to new commercial managers in other delivery units. Hence, the division of responsibilities between commercial manager and other project roles is unambiguous. To conclude, the most important aspects in role implementation are transparency, clarity, and respective responsibilities. When responsibilities and cooperation model are clear, the launch of the role will be more feasible, and benefits can be realized.

5.3 Theoretical implications

The empirical research utilized frameworks provided in existing literature, especially works of Lowe and Leiringer (2005). The major contribution to existing literature was the essence of change and claim management in the commercial manager role. Even though, these activities were highlighted in the literature, the empirical research suggested even higher relevance. Change and claim management was considered as core activities of commercial manager in the case firm, and highly relevant in achieving project success. Therefore, the thesis contributes also to the change and claim management literature in general by providing a wider perspective for change orders as useful for a contractor when seeking additional sales and profits. Changes must not be considered as mandatory burden but rather as means to benefit the client, the contractor, and the whole project.

Surprisingly, commercial managers, in addition to project managers, were not deeply involved in the sales phase of the project. Contract negotiation and formulation, as well

as all bid management activities, had little involvement. Core project team participated solely in supportive role, or none at all, in sales phase not taking the responsibility until the contract was signed. However, it was considered by many respondents that project manager's and commercial manager's involvement in sales phase is important. Thus, empirical findings confirmed that involvement in sales phase is required, even though it has not realized so far. The supportive involvement, however, contradicted with previous literature where contract formulation and negotiation were referred as key responsibilities of commercial manager.

The low involvement of commercial manager in procurement contradicted with previous theoretical findings. Procurement manager managed the entire procurement process whereas commercial manager seldom participated. The participation included ensuring that contractual issues in the client contract were transferred to the procurement function and, subsequently, into sub-contracts and supporting procurement function in decision-making and issue resolution in major issues.

The empirical study highlighted the importance of financial management compared to previous literature. In fact, financial management activities were suggested as top priority of commercial manager by each of three perspectives, commercial managers, project managers, and line managers. Commercial manager was responsible for all financial issues of the project including handling of cash-flow, invoicing, taxes, currencies, and insurances.

This thesis also introduced completely new essential activities for commercial manager, contributing to the activity list provided by Lowe and Leiringer (2005). Firstly, being deeply familiar with the client contract, commercial managers tend to be responsible for the formal and written communication with the client. Secondly, commercial reporting for the client, project team, and steering committee was referred as commercial manager's responsibility. Thirdly, commercial manager included high responsibility in establishing and leading the right project setup. In case of the international case firm, this entails managing the cooperation between different entities in multiple countries participating in project execution, and in some projects, this included also permanent establishment and consortium agreements.

For financial evaluation of the project, a completely new set of metrics was proposed, being developed from the partnering metrics presented by Gransberg et al. (1999). This provides new knowledge for existing literature on how benefits of effective commercial management and, particularly, the work of an appointed commercial manager, can be evaluated. The emphasis is on how the commercial manager has succeeded in proposing beneficial changes and in claiming negative impacts, such as time extensions, to client, suppliers, and sub-contractors. This enables academic society to realize the importance of effective commercial management, and to shift the fundamental negative view on change orders to focus on benefits and opportunities.

The thesis contributes to the project management literature, especially relating to commercial management and how projects can be organized commercially. Even though project management is an extensively studied academic field, commercial management has not received such a wide interest. Therefore, the research introduces the commercial manager role in a new context and introduces deeper case analysis about arranging commercial management and, consequently, the commercial manager role. It builds on the study of Lowe and Leiringer (2005), tests the relevance of proposed list of activities, and proposes a new set of important project management activities in this specific context. The study agreed on proposed competences of commercial manager as, in case projects, commercial managers' educational background was found to be a mix of technical, managerial, and business. For the financial success perspective, the study introduced a new set of metrics to track commercial success of the project, deriving from the metrics presented by Gransberg et al. (1999).

5.4 Limitations

The reliability of the qualitative study is limited by the individual bias of interviewees and the selection of projects. Five case projects, and three reference projects, were selected for further investigation causing individual bias of project personnel, their limited ability to remember relevant issues in these selected projects, and one-sided review of the project from only the case firm's perspective. The first two biases were mitigated by interviewing both project manager and commercial manager from each project. However, it was possible to only include the case firm's view about the project

Discussion

execution. In addition, projects were selected to have different key characteristics, such as interviewed personnel, market area, and client. This action also aimed, and achieved relatively well, to select projects to represent the entire project portfolio of the case firm. However, this aim was not completely achievable since, for example, Germany as a unit had not executed projects for every business line.

Inadequate data quality and small sample size limited the reliability of the quantitative study. To increase the reliability, pre-collected data was verified, and clearly erroneous projects were eliminated. Still, there were minor issues with different budget versions on projects that could not be excluded to maintain a reasonable sample size. Secondly, project population in general was by far too low to obtain results with high significance. The effect of small sample size was even amplified by high multicollinearity between key project variables. In other words, the existence of commercial manager was highly polarized in specific business lines and delivery units. This prevented to draw conclusions on the correlation between variables and key metrics.

Results, as such, are not generalizable to other context than the case firm itself due to the industry, market, and company specific project management habits significantly affecting commercial management. However, it can be argued that the results are applicable in many other context, too.

The research was conducted in the context of the case firm and especially in their Germany unit. The validity and the generalizability were increased by adding three reference projects from Finland unit to study how commercial management was arranged without an appointed commercial manager. Secondly, results are generalizable only within major projects. The study focused on major projects, with a contract value over 15 M€, having a full-time commercial manager. The empirical study showed that the commercial manager role is needed also in smaller projects, however, in different format since a fulltime role is not required. Finally, the study was conducted within a single business unit. Therefore, business unit related characteristics need to be considered when implementing the role in another business unit.

5.5 Further research

Among the academic society, results of the thesis provide an extensive basis for further research. Firstly, the research can be repeated across other markets, industries, and enterprises. Lowe and Leiringer (2005) suggested some industry specific applications of the commercial manager role. Therefore, it is expected that such variations occur also in fields having not yet been studied. Secondly, project specific factors affecting the commercial manager role must be included in further research. This thesis suggests that these factors, such as delivery type, risk category, contract value, and newness of the client, drive the need and the role of commercial manager. Thirdly, proposed metrics tracking commercial success require further evaluation and development to gain an understanding on performance implications of effective commercial management. Finally, the quantitative model introduced and propositions to improve it given act as a foundation for further and more comprehensive research to prove benefits of the presence of commercial manager role in project execution.

The case firm shall continue the exploration of underlying issues of commercial management. Firstly, the impact of locational differences in cultural and operational project execution practices needs to be analyzed. The Germany-based role proposition of the thesis requires customization depending on the delivery unit where the role is going to be implemented in. Secondly, the proposition is based on experience from major projects. When implementing the role in minor projects, tailoring of the role description is necessary. For example, whether the role is consultative or accountable needs to be decided. In other words, whether the role is external support role or integral part of project team. Thirdly, when role implementation requires financial justification, further elaboration needs to be conducted. The thesis provides financial performance metrics of commercial management and the quantitative model as a foundation. Having applied the role in more diverse set of projects throughout business lines and delivery units, the quantitative analysis can be performed with higher significance and reliability due to higher sample size and reduced multicollinearity.

6 References

- Alnuaimi, A. *et al.* (2010) 'Causes, Effects, Benefits, and Remedies of Change Orders on Public Construction Projects in Oman', *Journal of Construction Engineering and Management*, 136(5), pp. 615–622. doi: 10.1061/(ASCE)CO.1943-7862.0000154.
- Arditi, D. and Patel, B. (1989) 'Expert system for claim management in construction projects', *International Journal of Project Management*, 7(3), pp. 141–146. doi: 10.1016/0263-7863(89)90032-X.
- Atkinson, R. (1999) 'Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria', *International Journal of Project Management*, 17(6), pp. 337–342. doi: 10.1016/S0263-7863(98)00069-6.
- Brchner, J. (2006) 'Outsourcing', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 192–206. doi: 10.1002/9780470759509.ch9.
- Chen, P. and Partington, D. (2006) 'Three conceptual levels of construction project management work', *International Journal of Project Management*, 24(5), pp. 412–421. doi: 10.1016/j.ijproman.2006.02.009.
- Cooper, D. *et al.* (2005) *Project Risk Management Guidelines: Managing Risk in Large Projects and Complex Procurements*. 1st. Ed. London: John Wiley & Sons, Inc.
- Cox, A. and Ireland, P. (2006) 'Strategic Purchasing and Supply Chain Management in the Project Environment—Theory and Practice', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 390–416. doi: 10.1002/9780470759509.ch17.
- Cui, Q., Hastak, M. and Halpin, D. (2010) 'Systems analysis of project cash flow management strategies', *Construction Management and Economics*, 28(4), pp. 361–376. doi: 10.1080/01446191003702484.
- Davies, A. (2004) 'Moving base into high-value integrated solutions: a value stream approach', *Industrial and Corporate Change*, 13(5), pp. 727–756. doi: 10.1093/icc/dth029.
- Davies, A. and Hobday, M. (2006) 'Strategies for Solutions', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 132–154. doi: 10.1002/9780470759509.ch6.
- Fenn, P. (2006) 'Conflict Management and Dispute Resolution', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 234–269. doi: 10.1002/9780470759509.ch11.
- Fisk, E. (1997) *Construction project administration*. 5th. Ed. New Jersey: Prentice-Hall.
- Gransberg, D. *et al.* (1999) 'Quantitative Analysis of Partnered Project Performance', *Journal of Construction Engineering and Management*, 125(3), pp. 161–166. doi: 10.1061/(ASCE)0733-9364(1999)125:3(161).
- Helander, A. and Möller, K. (2007) 'System supplier's customer strategy', *Industrial Marketing Management*, 36(6), pp. 719–730. doi: 10.1016/j.indmarman.2006.05.007.

References

- Horner, M. (2006) 'Performance Measurement', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 270–296. doi: 10.1002/9780470759509.ch12.
- Hughes, W. (2006) 'Contract Management', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 344–355. doi: 10.1002/9780470759509.ch15.
- Ivory, C., Thwaites, A. and Vaughan, R. (2003) 'Shifting the goal posts for design management in capital goods projects: "design for maintainability"', *R and D Management*, 33(5), pp. 527–538. doi: 10.1111/1467-9310.00314.
- Kähkönen, K. (2006) 'Management of Uncertainty', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 211–233. doi: 10.1002/9780470759509.ch10.
- Keane, P., Sertyesilisik, B. and Ross, A. (2010) 'Variations and Change Orders on Construction Projects', *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 2(2), pp. 89–96. doi: 10.1061/(ASCE)LA.1943-4170.0000016.
- Kelly, J. (2006) 'Value Management of Complex Projects', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 298–316. doi: 10.1002/9780470759509.ch13.
- Kelly, J., Male, S. and Graham, D. (2004) *Value Management of Construction Projects*. 1st. Ed. Oxford, UK: Blackwell Science Ltd. doi: 10.1002/9780470773642.
- Kujala, S. *et al.* (2010) 'Business models in project-based firms – Towards a typology of solution-specific business models', *International Journal of Project Management*, 28(2), pp. 96–106. doi: 10.1016/j.ijproman.2009.08.008.
- Langford, D. and Murray, M. (2006) 'Procurement in the Context of Commercial Management', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 71–92. doi: 10.1002/9780470759509.ch4.
- Liu, S. and Wang, C. (2008) 'Resource-constrained construction project scheduling model for profit maximization considering cash flow', *Automation in Construction*, 17(8), pp. 966–974. doi: 10.1016/j.autcon.2008.04.006.
- Lowe, D. (2006) 'Afterword— Identifying and Defining a New Interdisciplinary Research Agenda for Commercial Management', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 440–457. doi: 10.1002/9780470759509.ch19.
- Lowe, D. (2008) 'Commercial and contract management - practitioner expectations on the content of an MBA for commercial executives', in *Proceedings IACCM International Academic Symposiums on Contract & Commercial Management*. London: The International Association for Contract & Commercial Management (IACCM), pp. 45–72.
- Lowe, D., Fenn, P. and Robers, S. (1997) 'Commercial Management: An investigation into the role of the commercial manager within the UK Construction Industry', *CIOB Construction Papers*, 81, pp. 1–8. Available at: <http://products.ihc.com/cis/Doc.aspx?AuthCode=&DocNum=246868>.
- Lowe, D. J. (2013) *Commercial Management: theory and practice*. 1st. Ed. Oxford: Wiley-Blackwell.

References

- Lowe, D. and Leiringer, R. (2005) 'Commercial management in project-based organisations', *Journal of Financial Management of Property and Construction*, 10(1), pp. 3–18. doi: 10.1108/13664380580001060.
- Lowe, D. and Leiringer, R. (2006) 'Commercial Management— Defining a Discipline?', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 1–17. doi: 10.1002/9780470759509.ch1.
- Lowe, D. and Skitmore, M. (2006) 'Bidding', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 356–389. doi: 10.1002/9780470759509.ch16.
- Morris, P. (2001) 'Updating the Project Management Bodies of Knowledge', *Project Management Journal*, 32(3), pp. 21–30. doi: 10.1177/875697280103200304.
- Morris, P. and Pinto, J. (eds) (2004) *The Wiley Guide to Managing Projects*. Hoboken, NJ, USA: John Wiley & Sons, Inc. doi: 10.1002/9780470172391.
- Murray, M. and Langford, D. (eds) (2003) *Construction Reports 1944–98*. Oxford, UK: Blackwell Science Ltd. doi: 10.1002/9780470758526.
- O'Brien, J. (1998) *Construction change orders*. 1st. Ed. New York: McGraw-Hill Book Company.
- Olsen, R. (1971) 'Can project management be defined?', *Project Management Quarterly*, 2(1), pp. 12–14.
- Oliva, R. and Kallenberg, R. (2003) 'Managing the transition from products to services', *International Journal of Service Industry Management*, 14(2), pp. 160–172. doi: 10.1108/09564230310474138.
- PMI (2004) *A Guide to the Project Management Body of Knowledge*. 3rd. Ed. Project Management Institute, Inc.
- Ross, A. and Hugill, D. (2006) 'Signals from Site— Embodied Logic and Management Accounting on Construction Projects', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 417–439. doi: 10.1002/9780470759509.ch18.
- Samset, K. (2003) *Project Evaluation: Making Investments Succeed*. 1st. Ed. Fagbokforlaget.
- Samset, K. (2013) 'Strategic and tactical performance of mega-projects - between successful failure and inefficient successes', in *International Handbook on Mega-projects*. Edward Elgar Publishing, pp. 11–33. doi: 10.4337/9781781002308.00008.
- Samset, K. and Volden, G. (2016) 'Front-end definition of projects: Ten paradoxes and some reflections regarding project management and project governance', *International Journal of Project Management*, 34(2), pp. 297–313. doi: 10.1016/j.ijproman.2015.01.014.
- Shenhar, A. and Dvir, D. (2007) *Reinventing project management: the diamond approach to successful growth and innovation*. 1st. Ed., Harvard Business Review Press. 1st. Ed.
- Shenhar, A. J. et al. (2001) 'Project Success: A Multidimensional Strategic Concept', *Long Range Planning*, 34(6), pp. 699–725. doi: 10.1016/S0024-6301(01)00097-8.

References

- Shrestha, P. and Fathi, M. (2019) 'Impacts of Change Orders on Cost and Schedule Performance and the Correlation with Project Size of DB Building Projects', *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 11(3), pp. 1–9. doi: 10.1061/(ASCE)LA.1943-4170.0000311.
- Smyth, H. (2006) 'Competition', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 22–39. doi: 10.1002/9780470759509.ch2.
- Swan, W., McDermott, P. and Khalfan, M. (2006) 'Trust and Commercial Managers: Influences and Impacts', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 172–191. doi: 10.1002/9780470759509.ch8.
- Turner, R. (1995) *The Commercial Project Manager*. London: McGraw-Hill Book Company.
- Walker, I. and Wilkie, R. (2002) *Commercial Management in Construction*. 1st. Ed. Wiley-Blackwell.
- Winch, G. (2001) 'Governing the project process: a conceptual framework', *Construction Management and Economics*, 19(8), pp. 799–808. doi: 10.1080/01446190110074264.
- Winch, G. (2002) *Managing Construction Projects*. 1st. Ed. Oxford, UK: Blackwell Science.
- Winch, G. (2006) 'The Governance of Project Coalitions— Towards a Research Agenda', in *Commercial Management of Projects*. Oxford, UK: Blackwell Publishing Ltd, pp. 324–343. doi: 10.1002/9780470759509.ch14.
- Winch, G. (2014) 'Three domains of project organising', *International Journal of Project Management*, 32(5), pp. 721–731. doi: 10.1016/j.ijproman.2013.10.012.
- Wise, R. and Baumgartner, P. (1999) 'Go Downstream: The New Profit Imperative in Manufacturing', *Harvard Business Review*, 77(5), pp. 133–141.
- Zidane, Y. *et al.* (2016) 'PESTOL - Framework for Project Evaluation on Strategic, Tactical and Operational Levels', *International Journal of Information Systems and Project Management*, 4(3), pp. 25–41. doi: 10.12821/ijispm040302

7 Appendixes

7.1 Appendix I: The interview questionnaire

Project:

Who has acted as project manager, commercial manager, project controller, etc. other key managers in the project?

Tell me about the project and how did it develop? schedule? costs? value? risk provision?

Verify numbers (original, revised, Final forecast) and contract type (EPC etc.)

How was the date of mechanical completion/handover/end of warranty period in relation to estimations?

What were the reasons for delays? Client or the case firm related?

Were there any liquidated damages? Why? How much (ballpark figure)?

How many changes was proposed in the project? number and amount?

How many changes were realized/approved in the project? number and amount?

How much claims were involved and how much work they required? In what extent they were succeeded to be transferred to the suppliers? How much did they cost?

Did any disputes occur? How much cost (ballpark figure) they caused?

How did you/project team prepare/plan risks in the project?

Did taxes or insurances require significant work in the project?

Which kind of commercial organization existed in site?

How big portion of changes were proposed from the site/project team/client?

What were the biggest risks/changes that realized? How did you/project team react?

What could have been done differently for avoiding drawbacks/penetrating opportunities?

Do you consider the project successful or unsuccessful? Why?

Did you develop execution guidelines for the project? commercial procedures? cost control procedures?

What were the lessons learned for commercial activities?

Appendixes

Responsibilities: (for commercial manager)

What is your academical/professional background?

Describe your average day within the project? Main day-to-day tasks?

What were project areas that you were responsible for? What about supported?

How have you been involved in procurement? in which extent? If no, should you?

What has been communication practices towards the client? suppliers? What was your role?

How have you maintained/developed the relationship, e.g. trust, with customer? suppliers?

What was your role in risk management?

What was your role in claim & change management?

How have you been involved in cash flow management? invoicing, payment follow-up?

Are there any additional tasks/management areas that you supported?

How much involvement the project required from you? / Were you working on only one project or did you have other projects going on simultaneously?

How did your involvement develop during project stages?

Which kind of tools did you use during the project and how much?

How extensively did you document changes? internal and external? Where?

How would you develop the role of commercial manager?

Responsibilities: (for project manager)

What did commercial manager do in the project? Relationship/communication, Risk, Change, Claim, Cash Flow, Procurement?

Additional tasks that commercial manager supported in?

Should commercial manager be involved in procurement also? How?

Did you find the role of commercial manager beneficial? How did commercial manager benefit the project outcome? Your work?

Do you think the project would have been less successful without commercial manager? In which cases, commercial manager was critical to overcome drawbacks?

Did commercial manager fulfill that role?

How did commercial manager's involvement/responsibilities develop during project stages?

Do you have any other requirements/needs for commercial manager? Developing the role?

Cooperation

How did you work together with project manager? responsibilities? communication?

How did you work together with project controller? responsibilities? communication?

What about other managers?

How much you were in contact with the client? suppliers? other stakeholders?

Appendixes

7.2 Appendix II: The interview template 1

	Project Manager	Commercial Manager	Procurement Manager	Engineering Manager	Project Controller	Scheduler
Procurement Management						
Contract Management						
Relationship Management						
Communication Management						
Risk Management						
Change Management						
Claim Management						
Cash Flow Management						

2 = Responsible / High involvement

1 = Supporting / Medium involvement

0 = None / Very low involvement

7.3 Appendix III: The interview template 2

	Activity	High	Medium	Low	None	Description
Contract Management	Contract Negotiation					
	Contract Formulation					
	Dispute Resolution					
Bid Management	Bidding					Proposal to the customer
	Procurement Strategy					Procurement plan (from where?, what?)
	Price Formulation					Identifying price based on costs, margin, risks
	Creation of outline proposals					Preliminary implementation plan or concept in sales phase
Financial Management	Cash Flow Management					planning and tracking how much money is coming into and going out of your business
	Cost Management					planning and controlling the budget of a project or business
	Payments					On time payment follow-up
	Cost Value Reconciliation					monitoring and measuring actual expenditure and progress against budgeted project expenditure and schedule. It tracks margin progression from initial entry margin to the final exit margin on project completion.
	Claim Formulation					
Other	Risk Management					
	Acquiring Approvals and Permits					e.g. environmental and construction permits
	Value Management					improving and sustaining a desirable balance between the wants and needs of stakeholders and the resources needed to satisfy them.
	Sub-Contractor / Supplier Administration					procurement of materials, equipment or services
Additional?						