

Ville Peräkorpi

**FINANCIAL PROCESSES IN THE SALES
AND OPENING PHASES OF MEGA PRO-
JECTS FROM THE CONTROLLER'S
POINT OF VIEW**

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ABSTRACT

Ville Peräkorpí: Financial processes in the sales and opening phases of mega projects from the controller's point of view
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Large projects are usually very complex which makes their managing difficult. Clear processes, as well as roles and responsibilities, help to manage projects and prevent risks. However, previous literature has focused a lot on the importance of communication and flexibility in large projects.

In the case company of this thesis, certain types of large projects are called mega projects. These mega projects are usually worth more than 100 million euros. The thesis focuses on financial processes in the sales and opening phases of mega projects especially from the controller's point of view. A controller of mega projects, mega controller, is expected to have a good overall view of the project already in the sales phase. The mega controller is expected to actively participate e.g. in defining currency hedging plan or contract structure. He or she is also expected to act as a link between different functions. In the opening phase of the project, the mega controller is expected to direct the whole opening process by determining the big picture of the project structure and by giving clear responsibilities to e.g. other controllers and cost estimators.

Results of the thesis show many challenges in the financial processes of mega projects from the mega controller's point of view. The main challenge found in the study is that processes are not always followed. Because of that, currency hedging plan and contract structure aren't often considered early enough. Currency hedging plan may even be left totally out of considerations. The second challenge is the lack of relevant information of cost estimations for currency hedging or project's opening. This is mainly caused by a lack of communication between controllers and cost estimators. The third challenge relates to the unclarity of roles and responsibilities of the project's opening to ERP system. Also, many other challenges are found during the study.

To solve the main challenge, this thesis suggests that the case company would add two meetings to the sales process. The first meeting, contract and global mobility review, would force stakeholders to consider the contract structure of the project in the firm proposal phase. The second meeting, currency hedging plan meeting, would force stakeholders to consider currency hedging plan, also in the firm proposal phase. The second challenge would be alleviated by taking currency basket template into use in cost estimation work. The third challenge is tried to be solved by a process description made as a result of this thesis. The process description illustrates the roles and responsibilities of different stakeholders in the sales and opening phases. At the conclusions, a roadmap for the case company is introduced to illustrate the steps the case company should next take regarding the challenges.

Keywords: large projects, mega projects, financial processes, the role of controller, currency hedging plan, contract structure, project structure, cost estimation

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

TIIVISTELMÄ

Ville Peräkorpi: Talouden prosessit megaprojektien myynti- ja avausvaiheissa controllerin näkökulmasta
Diplomityö
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Suuret projektit ovat yleensä monimutkaisia, mikä tekee niiden johtamisesta hankalaa. Selkeät prosessit sekä roolit ja vastuut helpottavat projektien johtamista ja ehkäisevät riskejä. Aiempi kirjallisuus on kuitenkin keskittynyt kommunikoinnin ja joustavuuden tärkeyteen suurissa projekteissa.

Tämän diplomityön kohdeyrityksessä tietyntyyppisiä suuria projekteja kutsutaan megaprojekteiksi. Nämä megaprojektit ovat yleensä arvoltaan yli 100 miljoonaa euroa. Tämä työ keskittyy talouden prosesseihin megaprojektien myynti- ja avausvaiheissa. Prosesseihin keskitytään erityisesti controllerin näkökulmasta. Megaprojektien controllerilla, mega-controllerilla, odotetaan olevan hyvä kokonaiskuva projektista jo projektin myyntivaiheessa. Mega-controllerin odotetaan osallistuvan aktiivisesti esimerkiksi valuuttasuojauksuunnitelman ja sopimusrakenteen määrittelyyn. Hänen odotetaan myös toimivan linkkinä eri toimintojen välillä. Projektin avausvaiheessa mega-controllerin odotetaan johtavan koko avausprosessia määrittelemällä projektirakenne isossa kuvassa sekä antamalla selkeät vastuualueet esimerkiksi muille controllereille ja kustannuslaskijoille.

Diplomityön tuloksista ilmenee useita haasteita megaprojektien talouden prosesseissa mega-controllerin näkökulmasta. Tärkein haaste on se, että prosesseja ei aina noudateta. Tämän takia valuuttasuojauksuunnitelmaa ja sopimusrakennetta ei ole usein pohdittu tarpeeksi aikaisin. Valuuttasuojauksuunnitelma saattaa olla jätetty jopa kokonaan huomioitta. Toinen tutkimuksessa löydetty haaste on relevantin informaation puute kustannusestimaateissa valuuttasuojauksia ja projektin avaamista varten. Tämä johtuu suurimmalta osin kommunikoinnin puutteesta controllereiden ja kustannuslaskijoiden välillä. Kolmas haaste liittyy roolien ja vastuiden epäselvyyteen projektin avaamisessa ERP-järjestelmään. Lisäksi, tutkimuksen aikana löytyy myös muita haasteita.

Ratkaistakseen tärkeimmän haasteen, tämä työ ehdottaa, että kohdeyritys lisäisi kaksi palaveria myyntiprosessiin. Ensimmäinen palaveri, contract and global mobility review, pakottaisi sidosryhmät pohtimaan sopimusrakennetta kiinteän tarjouksen vaiheessa. Toinen palaveri, currency hedging plan meeting, pakottaisi sidosryhmät pohtimaan valuuttasuojauksuunnitelmaa, myös kiinteän tarjouksen vaiheessa. Toinen haaste helpottuisi, jos valuuttakori -pohja otettaisiin käyttöön kustannuslaskennassa. Kolmatta haastetta pyritään ratkaisemaan tämän työn tuloksena saatavalla prosessikuvauksella. Prosessikuvaus havainnollistaa eri sidosryhmien roolit ja vastuut myynti- ja avausvaiheissa. Johtopäätöksissä esitellään suunnitelma, joka havainnollistaa, mitä askeleita kohdeyrityksen tulisi ottaa seuraavaksi haasteisiin liittyen.

Avainsanat: suuret projektit, megaprojektit, talouden prosessit, controllerin rooli, valuuttasuojauksuunnitelma, sopimusrakenne, projektirakenne, kustannuslaskenta

Tämän julkaisun alkuperäisyys on tarkastettu Turnitin OriginalityCheck –ohjelmalla.

PREFACE

After five years of studying in Tampere University, my studies are now ending. My feelings are relieved but sad. I have enjoyed my time in University, but it is now time to open a new chapter in my life.

Writing this thesis has required a lot of effort. Luckily, I have had many supportive people around me. I want to thank my instructor Maija, from the target company, for patiently guiding me through the research process. Similarly, I want to thank my instructors Tuomas and Teemu from Tampere University for their tips and advice for the thesis. Also, interviewees deserve big thanks for participating in this research enthusiastically and with open mind. Finally, I want to thank my girlfriend who has been supporting me during the whole University time.

Tampere, 18 August 2019

Ville Peräkorpi

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LIST OF SYMBOLS AND ABBREVIATIONS

BU	Business unit
ERP	Enterprise Resource Planning
MA	Management accounting
MAS	Management accounting system
MCS	Management control system
MUP project	Multi-unit project
TU	Technology unit
WBS	Work breakdown structure

1. INTRODUCTION

1.1 Background and motivation

Controllers may have a lot of responsibility for control in an organization (Goretzki and Messner 2018). Controllers can be also nominated for individual projects. Especially large projects need a controller who is aware of different factors that can have an influence on a project from a financial point of view. According to Burström et al. (2013), a project controller usually has certain formal roles, such as providing project cost or profitability measurements. However, they often have various informal roles as well (Burström et al. 2013). Thus, the responsibilities of the project controller are not always very clear. One critical role of project controller is often to act in boundaries of functions and to get people to communicate with each other (Burström et al. 2013, Laine et al. 2016a). Still, this boundary role of project controller is not often demanded officially by the organization (Burström et al. 2013). The role of the project controller can thus be very unclear to many stakeholders. The unclarity of roles in different projects can cause problems because it makes coordination of project more difficult (Bechky 2006).

Large projects are often leading to cost overruns and delays in completion (Eden et al., Flyvbjerg et al., Flyvbjerg, Miller and Lessard, Flyvbjerg et al., see Sanderson 2012). To tackle these issues, focus on project management literature has been moving from operational tasks to an interaction between project participants (Sanderson 2012). As said, the project controller may have a critical role in the interaction of different functions because he or she can get people to communicate and cooperate with each other. However, better interaction of project members wouldn't solve every challenge of the projects. Instead, the organization should balance between strict control and flexible cooperation (Koppenjan et al. 2011).

In addition to regular projects, the case company of this thesis delivers large projects which they call mega projects. Mega projects are usually worth more than 100 million euros. Mega projects involve usually multiple units and they can consist of multiple contracts with the customer. Because of the complexity of mega projects, financial processes are often much more complicated than in smaller projects.

In the sales phase of the mega project, it is critical to create currency hedging plan and contract structure in an early phase. They are important because these should be introduced for decision makers before final negotiations with the customer. However, the case company has had challenges with these issues. Currency hedging and contract structure haven't got enough attention before the contract has been already signed. Because the worth of mega projects is so large, even small currency fluctuations can influence a lot to the project margin, if currency hedges are not done directly after the contract is signed. Similarly, certain contract structure can cause large tax payments to the case company if tax expert hasn't had time to find the optimal way to structure contracts with the customer. These issues can, therefore, have big influences on the case company's profit if they are not considered carefully at the sales phase.

After the sales phase is over, and the contract is signed, the project should be opened to the case company's internal systems. Project directors and managers are waiting for project structure because they need it to e.g. monitor the project costs. In the case company, roles and responsibilities in this phase aren't very clear. The unclarity of responsibilities often causes delays to the processes.

Thus, financial processes have a remarkable role in mega projects and finance people are not alone responsible for handling them. Instead, cooperation and collaboration between different stakeholders are necessary in order to handle processes properly.

1.2 Research objectives and expected results

This thesis discusses financial processes from the controller's point of view in the case company. Objectives of the thesis are defined together with the thesis' instructor from the case company. The following three objectives are defined from the case company's viewpoint. Firstly, *to clarify and improve the processes of mega project controlling especially in the sales and opening phases of the project*. Secondly, *to define and clarify the roles and responsibilities of actors participating in financial processes*. Finally, *to create a concrete process description for controlling mega projects*. Hence, this thesis focuses on the roles and responsibilities of financial processes. As a result of the thesis, a concrete process description is created. The process description is formed separately to different processes so that all discussed processes could be improved.

Currently, literature isn't found from the field of financial processes of large projects. Literature is also lacking the controller's work in large projects. Therefore, the scientific objective of this thesis is to fill this gap in the literature. This thesis is handling financial

processes in large projects from the controller's viewpoint and it offers comprehensive case study around this subject.

Research questions for this thesis have been chosen to enable wide handling of different challenges in mega projects. However, they are chosen to limit the scope of the thesis so that it would stay in the limits of a master's thesis. Defined research questions are illustrated below.

1. What are the main factors that cause challenges in the financial processes of mega projects especially in the sales and project's opening phases?

2. How to improve project controlling in mega projects especially in the sales and project's opening phases?

Research questions have a relation to each other because it is easier to answer the second research question after finding answers to the first research question. The first research question drives to find different challenges in financial processes and then to prioritize them based on their importance. The second research question drives to find improvement areas for project controlling. Project controlling consists mostly of financial processes. The improvement areas of project controlling are easier to find after the challenges in financial processes are identified.

1.3 Scope of the thesis

The thesis focuses on the sales and project's opening phases of mega projects. It handles financial processes that relate to the work of mega controller. Financial processes handled in this thesis include e.g. cost estimation, currency hedging, definition of contract structure, project's opening to ERP systems, and general work of mega controller.

These processes are linked to each other in many ways. Cost estimations provide information for currency hedging and project's opening. Even though cost estimations are not primarily planned to serve the needs of currency hedging and project's opening, it can be much easier for cost estimators than controllers to find certain information for these processes. Creating the project structure for the project's opening could also provide needed information for currency hedging. Contract definition is not linked to these processes, but it relates to mega controller's work. Amongst other things, the mega controller makes sure that contract and currency hedging issues are considered carefully before signing the contract.

The concept of the mega controller hasn't been in use very long time in the case company, which is why the role is still unclear to many stakeholders. Therefore, this thesis is also trying to clarify the role of mega controller in the case company.

1.4 Structure and methodology of the thesis

This thesis is conducted as a case study in the case company. It is divided into introduction, literature review, methodology, results, discussion, and conclusions. At the beginning of the study, a literature review is made around subject areas, such as project management, management control and the role of controller. These themes are discussed first separately and then combined to the theoretical framework. The purpose of the literature review is to introduce literature around controlling large projects. After the literature review, the methodology of the thesis is introduced. Based on methodological choices, results are gathered.

Results are gathered through interviews and secondary data. Thus, the thesis is made as a multi-method qualitative study. Interviewees consist of different stakeholders of financial processes. Secondary data is e.g. email conversations and presentations of meetings. Results section includes separately a current state of different financial processes and improvement suggestions to different financial processes.

After results are presented, the discussion section links the results to previous literature. Answers to research questions are presented in conclusions. Conclusions include also a roadmap for the case company for concrete steps that it should take regarding financial processes and the role of mega controller. Finally, evaluation and limitations of the thesis and suggestions for future research are presented.

2. PROJECT MANAGEMENT AND CONTROL IN LARGE PROJECTS

2.1 Project management

Many can think that projects are easier and easier to manage because of modern technology and ways of working. However, economic pressures, intense competition and other factors in the business environment are affecting projects more and more. To control projects in modern society, projects need to be managed properly. Project management includes planning, coordinating and controlling of different kinds of activities. Management of projects are never exactly similar as projects differs always from each other. Differences in projects can occur for example in commercial, administrative or physical characteristics. (Lock 2007, p. 3-5) A project manager must learn to handle many kinds of problems and opportunities which are occurring in different stages of the project. Large projects are so complex that it is difficult to understand all actions that need be taken to ensure successful execution of the project. To facilitate project management, the project must be divided into smaller and more understandable parts. (Cleland and Ireland 2006, p. 56)

Projects have always many kinds of risks. The purpose of project management is to prevent these risks and problems. This is done by planning, organizing and controlling activities. The process of project management should begin before any commitments have been done, and it should continue until everything regarding the project is finished. The project manager has the most important role in securing that project management is done properly. The project should satisfy all principal stakeholders by staying in time-scale and in budget without using more resources than planned. (Lock 2007, p. 3)

To reach the objectives of the project, it must be properly organized. The organization contains people, communications, jobs and resources. However, every organization is different which makes organizing harder. In effective organization, everyone has clear tasks and people know what is expected from them. Every actor should be aware of authorities inside the organization. To get people to know their responsibilities, management must have effective communication towards subordinates. Good knowledge about the project increases the motivation of employees. Conversely, badly informed people are probably not very motivated, and it always affects other people around them as well. Effective communication also gives people knowledge about the relevant expert from whom to ask for advice. (Lock 2007, p. 127)

Different project management instruments are used to ensure that the actual outcome of the project would be as identical as possible to the planned outcome. For example, tools such as change management, risk management and project controls can be used to make sure that the project is proceeding as planned. (Koppenjan et al. 2011)

2.2 Project cost management

Cost management of project consists of activities related to cost estimation, budgeting and cost monitoring. Thus, cost management is not only monitoring costs and comparing them to the budget. Creating a budget includes for example a cost estimation, pricing of delivery, profit budgeting, planning of cashflow and financing the project as well as securing the profitability. The profitability of project is dependent of the whole lifecycle of the project. Hence, it should consider also indirect benefits for the company. Cost management affects also to other parts of project management. Therefore, it is important to balance schedule, costs and resource planning with each other. (Artto et al. 2011, p. 150-151)

Something can always happen in the project which may increase project expenses or delay expected revenues. These incidents can be unavoidable, but often these risks can be prevented by the project organization. The main purpose of cost control is to make sure that foreseeable incidents are prevented so that the project wouldn't be affected economically. (Lock 2007, p. 429) Interestingly, Olawale and Sun (2010) found that five biggest factors that make it more difficult to control project costs and time are all internal factors of the project.

Cost management is especially important in the project's defining and planning phases. Decisions related for instance to broadness, resourcing, and schedule of the project are noteworthy because they define project's cost structure and budget. The main part of the project's total costs is determined already at the beginning of the project. Possibilities to influence project costs during the project decreases as project proceeds (see Figure 1). (Artto et al. 2011, p. 150-151)

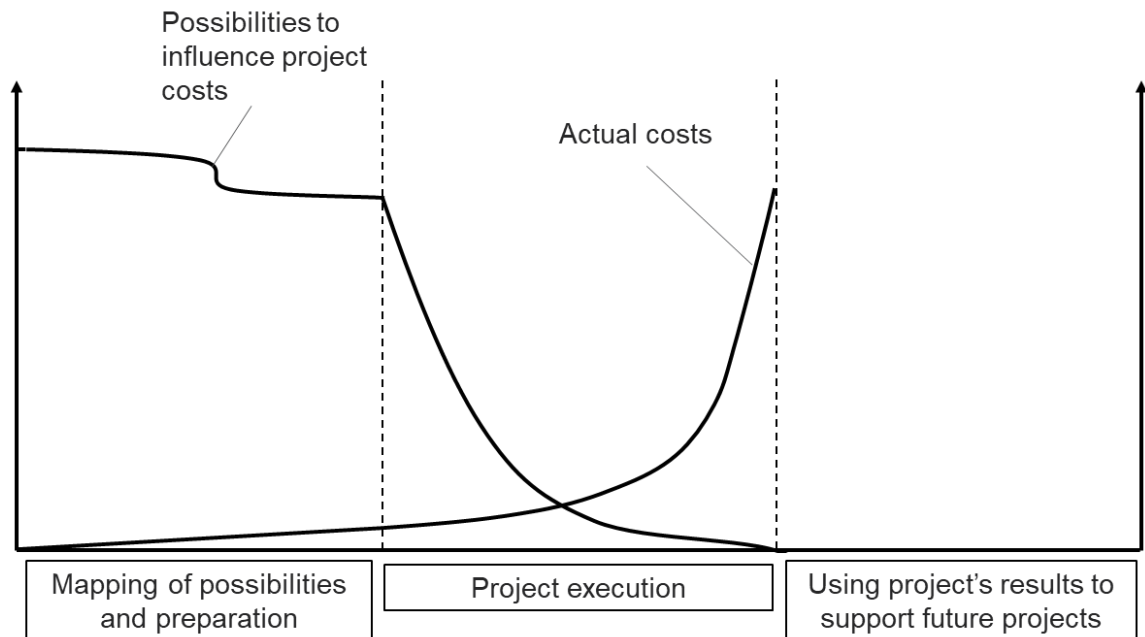


Figure 1. Influencing possibilities to project costs during the project lifecycle (adapted from Artto et al. 2011, p. 152)

From the viewpoint of project supplier, signing the project contract limits considerably the contents of project and choice alternatives. In addition, usually main purchases with sub-contractors are signed in the beginning of the project. (Artto et al. 2011, p. 150-152)

In the beginning of the project, the importance of decisions is high, as mentioned earlier. However, the quantity of decisions made in the initial phase is relatively low. For example, wrongly estimated costs in the sales phase might ruin the profit of the whole project. Quantity of needed decisions increases as project progress, but the importance of a certain decision decreases. (Artto et al. 2011, p. 152-153) To conclude, decisions before signing the contract with the customer are extremely important for the success of the project.

Work breakdown structure

Projects consist of tasks. Naturally, simple projects contain fewer tasks and they are therefore easier to manage. Bigger and more complex projects consist of numerous tasks. To handle this jungle of tasks, a concept called work breakdown structure (WBS) has been developed. (Lock 2007, p. 165-179)

WBS is a tree structure of tasks needed in a project. The project itself is in the top of the tree. The next levels below are getting more detailed in every level. (Lock 2007, p. 165-179) An example of a simplified WBS structure is illustrated in Figure 2. As shown in the figure, WBS is usually coded with numerical listings to facilitate understanding of the whole project (Cleland and Ireland 2006, p. 272-275).

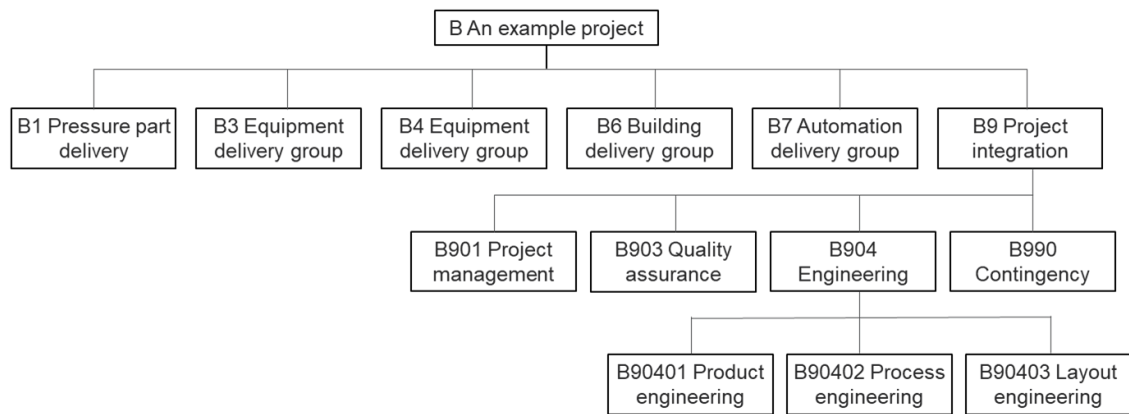


Figure 2. A simplified example of WBS structure (part of the structure is left out)

WBS helps to divide a large project into manageable units. Each of these units can be called work packages. Every work package has a person who is responsible for reaching assigned objectives, detailed task descriptions, specifications, schedule, and a budget. This work package manager is responsible for the completion of the work package objectives in terms of technical objectives, schedules, and costs. (Cleland and Ireland 2006, p. 272-275)

Development of WBS provides many benefits. It summarizes all products and services that are part of the project. It shows interrelationships between work packages. It establishes a matrix organization where authorities and responsibilities are displayed. It helps to estimate project costs, perform risk analysis and schedule work packages. (Cleland and Ireland 2006, p. 272-275) Thus, WBS seems to be a critical tool in large and complex projects to be able to manage them properly.

Cost estimation

Cost estimates are based on WBS. Cost estimation is needed in every phase of the project. It is continuous work, but the way of using it change during the project's lifecycle. Cost estimation is needed already when the profitability of project possibilities is examined. Cost estimation is thus used to decide if the project is worth investing more resources. More detailed cost estimation is needed in the preparation of project offer. Cost estimation is also used as a basis for the project budget. In the delivery phase of the project, cost estimation is updated all the time to ensure the latest information about costs. Thus, cost estimation helps to forecast future changes in costs especially in situations where future costs are entered to information systems before actual costs have come. After the project, cost estimation can be used to assess profits and costs of the project. (Artto et al. 2011, p. 158)

To estimate project costs, cost information must be gathered from multiple sources. Information sources can be for example similar former projects or cost estimations of subcontractors. Often experienced employees can be also asked to tell their opinion about costs. In international projects, cost estimations should take also currency risks into account. (Artto et al. 2011, p. 158-159)

According to Lock (2007, p. 52-53), cost estimates are often classified according to their degree of confidence. These classifications depend on the time available for cost estimators, quality of cost information and the project phase. Organizations have usually their own ideas of classifications. However, Lock has made classifications as follows. Ballpark estimates are vague estimates in situations where all details of the project are not necessarily yet decided. They are quick to estimate, but the accuracy is not very good as the estimate can change $\pm 25\%$ from the original estimate. Comparative estimates are more accurate with an accuracy of $\pm 15\%$. They can be used to compare the estimated project to a similar previous project. This accuracy level can be achieved already before detailed design work is done. However, it requires that cost estimator has access to cost and technical archives of past projects. Additionally, an outline of the project must be clear to cost estimator. Feasibility estimates provide accuracy of $\pm 10\%$. To achieve this good accuracy, a significant amount of preliminary project design must be carried out. In many situations, this accuracy level is enough to make a tender. The most accurate estimates are called definitive estimates. Their accuracy is $\pm 5\%$. This accuracy cannot be achieved before most of the design work is done, significant purchase orders are placed, and the work of the project is already well advanced. Thus, a definitive estimate can be made only after many of the estimated costs are already actualized. (Lock 2007, p. 52-53)

2.3 Project control

Project control provides means to ensure that the project progresses as planned and expected benefits are achieved from the project. It is a central part of project management. Project control means comparing the actual progress to the planned progress, analysing perceived deviation, identifying and comparing alternatives, and taking corrective actions if needed. (Artto et al. 2011, p. 248)

Monitoring and reporting are fundamental parts of project controlling. Monitoring is a continuous gathering of information which helps to build knowledge about how the project proceeds. This, in turn, helps to make decisions about needed actions. Reporting is formal and often regular monitoring of the project. Reporting can be tied to for example milestones, deviations or time. (Artto et al. 2011, p. 248-250)

To be able to control a project, an organization must have some way to get information about the state of the project and using the resources. This information can then be compared to original objectives and used to identify corrective actions. To fulfil these needs, it is necessary to determine, develop, and maintain a control system. An effective control system of the project is usable in many matters. It helps to plan thoroughly how much work the project requires. Time schedule, work load and costs are well assessed with a control system. Control system provides a platform for clear communication of needed project work. It provides also real-time information about progress and cumulative costs and helps to compare them to planned figures. Accuracy of the control system should be adapted based on the complexity of the project. (Artto et al. 2011, p. 248-250)

Information about project progress doesn't help as such. In addition, the reasons behind reported numbers and deviations should be identified. The sooner the information is available, the easier is to make corrective actions. Sometimes needed corrective actions are so wide that they can mean for example rearrangements of resources or changes in the budget. (Artto et al. 2011, p. 248-250)

However, it is good to keep in mind that management control systems for the project cause expenses. Increasing or intensifying control shouldn't be the main purpose. In project controlling it is better to find an optimum contribution with smaller expenses but at the same time ensuring smaller risks and bigger benefits. (Artto et al. 2011, p. 248-250)

As discussed above, reporting is a crucial part of project control. Without appropriate monitoring and reporting, project controlling would be random and undefined. Logical reporting is needed to understand the state of the project and to help decision making with facts. Form of reporting should be changed based on the project. Reporting doesn't need to be very formal or frequent for small projects. Conversely, large and complex projects might need very systematic and frequent reporting which ensures that project management has a good overall picture of the project. (Artto et al. 2011, p. 250-252)

Accuracy and frequency of reporting depend on e.g. complexity of the project and project organization, demands of stakeholders and situational needs. Reporting of subproject should probably be more detailed than summary reporting for project's executive team. However, sometimes also executive team needs detailed information for example to explain the worst variances. (Artto et al. 2011, p. 252-255)

2.4 Risk management and uncertainty in mega projects

A lot of research has been done about risk management and uncertainty in large projects. However, major of these studies relate to public infrastructure projects which are called mega projects. (Sanderson 2012, Nachbagauer and Schirl-Boeck 2019, Kardes et al. 2013, van Marrewijk et al. 2008)

Mega project is a large-scale project, which delivers a substantial piece of physical infrastructure or a capital asset. Mega projects last for many years, or even decades, and their clients are mostly from the public or governmental sector. However, the contractor is usually from a private company. (Sanderson 2012, Nachbagauer and Schirl-Boeck 2019) According to Flyvbjerg (2014) mega projects are very large, complex and transformational projects that typically cost over a billion dollars. They take many years to plan, develop and build. Mega projects involve multiple public and private stakeholders and they have an influence on millions of people. (Flyvbjerg 2014) This thesis handles mainly large projects between private companies. However, mega projects have so many similarities to private-private projects that they can be used as a reference to other large projects.

According to many studies (Eden et al., Flyvbjerg et al., Flyvbjerg, Miller and Lessard, Flyvbjerg et al., see Sanderson 2012), megaprojects are often leading to cost overruns and delays in completion which makes risk management very important matter in megaproject management.

Managing risks, uncertainty and unexpected in projects are traditionally approached through planning and controlling. However, Nachbagauer and Schirl-Boeck (2019) say that unexpected events cannot be planned nor avoided. Organizations and managers can, however, prepare for unexpected. Means to prepare for this are not very simple. Nachbagauer and Schirl-Boeck claim that to prepare to unexpected, the organization must balance between strict structure and self-organization in the areas of planning, communication, hierarchy and organizational culture. (Nachbagauer and Schirl-Boeck 2019) According to Sanderson (2012) focus on project management literature is moving from purely technical and operational tasks to the interaction between participants who are responsible for those tasks in the project. Interest is moving more on organizing and coordinating those tasks. Performance problems in megaprojects are caused by under-developed governance mechanisms which means that project participants are not able to provide flexible and strong response in unusual situation (Loch et al., Miller and Hobbs, Miller and Lessard, Morris, Winch, cited in Sanderson 2012).

As megaprojects are very complex, it is not possible for the project manager to monitor the developments in all areas. Project managers must select what to focus on. Hence, there occurs a risk to overlook important developments in other areas. (Nachbagauer and Schirl-Boeck 2019) Project managers often have an illusion of control in complex projects (Langer 1975). They tend to believe that they can control the outcome of the project even if outcomes are random (Kardes et al. 2013). A project manager's belief of his or her abilities to affect the outcomes of the project often makes him or her to underestimate risks and overestimate positive information (Durand 2003, Simon et al. 2000). This illusion is more common in projects with high uncertainty (Kardes et al. 2013). As a matter of fact, the higher the uncertainty, the higher overvaluation of control abilities of the project (Durand 2003, Titus et al. 2011).

Traditionally, formalized planning and control is believed to be a way to success in securing that time, budget and scope are at the desired level. However, in megaprojects, individuals aren't usually able to make rational decisions in unexpected events because of complexity, ambiguity and urgency of the project. To handle this complexity, megaproject managers need to balance between direct control and a high degree of freedom. Despite the freedom in controlling, planning should remain in megaprojects as it makes people to discuss and agree with each other. This makes common aims and understanding visible to everybody. Projects also need clear structures for communication. Communication should be intense, fast and effective to avoid too much information and confused communication. Accountability and functional responsibilities are still needed to coordinate the project. Nevertheless, a certain form of breaking rules should be acceptable. The importance of communication increases in complex projects as project managers may become narrowminded and inflexible in stressful situations. (Nachbagauer and Schirl-Boeck 2019)

Van Marrewijk et al. (2008) studied two different megaprojects. These projects were both large public-private projects, but they differed totally in practices related to project culture. Both projects had people from multiple external organizations. First of the projects couldn't make the project culture very motivating. There was "a fighting spirit" based on internal values. Project complexity was lowered to the level that project teams couldn't connect to external partners. Therefore, there was a lot of distrust and lack of information sharing between the project team and external partners. Supposedly, cost overruns were enormous in this project. (Van Marrewijk et al. 2008)

Second of the projects was the opposite regarding project culture. From the beginning, all the participating organizations participated to the alliance management team of the

project. The project put a lot of effort to project culture and invested to for instance common workshops, social days and seminars. The project was defined clear KPI's for every partner of the alliance. This second project was completed on time and budget, and it also exceeded the expectations for the environment and community. (Van Marrewijk et al. 2008)

To conclude the results of Van Marrewijk's et al. (2008) study, we can perceive the importance of communication in large and complex projects. The study criticises project management literature that still focuses largely on top-down conception.

2.5 Large projects require both control and flexibility

Project management has changed towards more flexible management to handle more complex situations. Complexity arises for example from formless structures, discontinuous work flow or turbulent environments. (Hodgson 2004) Still, project management tools are primarily developed for mechanistic use and are based on hierarchies, division of work, linear cause-effect relationship, etc. (Geraldi 2008)

Koppenjan et al. (2011) found that project management literature has two different approaches to manage uncertainty and risk in large projects. The first approach concentrates on planning and control (see for example Cooke-Davies 2002, Burke 2003) whereas the second type focuses on flexibility of the management (Artto and Wikström 2005). According to Geraldi (2008) projects usually begin as chaotic systems which is caused by many things. Authorities and responsibilities are not clearly defined, project members don't know each other's working styles, cooperation forms are not clear, etc. Order of the project will be increased as project proceeds. (Geraldi 2008) Geraldi and Adlbrecht (2008) found that at the final phases, the project needs very strictly coordinated tasks and responsibilities as well as other structures. However, they think that some room should be left still for flexibility which might be needed in unpredictable situations (Geraldi and Adlbrecht 2008).

Perminova et al. (2008) claim that traditional project management highlights the importance of conforming time, budget and scope constraints. However, it leaves behind aspects, such as continuous improvement and reflective learning. This, in turn, causes project companies to become less flexible and unable to gather knowledge and experience that are needed in unpredictable situations. Perminova et al. link uncertainty to characteristics of evolution. They claim that evolution cannot be achieved without uncertainty. Therefore, a firm can achieve better performance by managing its uncertainties. Traditionally project risk management and project uncertainty management deal risks as

certainties. However, they don't have a common understanding about the definition of uncertainty, which means that they don't have suitable tools to manage it either. (Perminova et al. 2008)

Koppenjan et al. (2011) created a framework which helps to analyse project management. The framework is based on the two approaches mentioned above. Approaches were named Type I approach and Type II approach. Type I approach refers to traditional approach thus its perspective is *predict-and-control*. In accordance with this approach, outcomes of the project should be predicted accurately so that clear and narrow task definitions could be made. Type II approach is an alternative, organic approach with *prepare-and-commit* perspective. The second approach is suitable when uncertainty and complexity are constant, and they are shared with many actors. According to this approach, the scope will change because the project has so many unknown aspects. Tasks are defined more broadly than in Type I approach because different actors need to cooperate closely with each other. Coordination has more horizontal character as many functions participate. Information is exchanged more openly and information sharing between different actors is in driven by demand. Differences between type I and type II approaches are described in table 1. (Koppenjan et al. 2011)

Table 1. *Two approaches to manage uncertainty in projects (adapted from Koppenjan et al. 2011)*

	Type I	Type II
	Predict-and-control	Prepare-and-commit
Terms of reference	Blueprint	Functional
Task definition	Narrow for best control	Broad for best cooperation
Contract	Task execution	Functional realisation
Incentives	Work-task based	System-output based
Change	Limit as much as possible	Facilitate as much as needed
Steer	Hierarchical	Network
Information exchange	Limited, standardised	Open, unstructured
Interface management	Project management task	Shared task

Koppenjan et al. (2011) found that despite a clear theoretical framework for management approaches, the one-sided approach cannot be used. However, many kinds of combinations could be made from these two approaches. Problems in projects are usually so complex that project management must use strict control at some degree but at the same time enable flexible cooperation. Still, management approaches are not often decided consciously because external conditions often direct project management at the beginning of the project. (Koppenjan et al. 2011)

Perminova et al. (2008) found that the most important elements in managing uncertainty are reflective learning and sensemaking as they enable flexibility and rapidness in decision making situations. Still, standardized processes are needed to offer a basis for reflective processes. They also say that different types of processes are needed to enable project management to perform, and not only conform to the plan. Because project business develops fast, it is obvious that none procedure can be implemented only once. Conversely, clear need occurs for continuous revision of best practices. (Perminova et al. 2008)

2.6 Coopetitive tensions in projects

Large projects are often carried out in cooperation of multiple different units. However, according to Seran et al. (2016), units usually have some kind of competition between each other. For example, units compete for human, technological and finance resources of the parent company. They, therefore, must to simultaneously cooperate and compete. This kind of relationship is called coopetitive. (Seran et al. 2016)

Through coopetition, organizations can get many benefits: research and development can be accelerated, costs can be reduced because of the synergies, sales of complementary products can be increased, product and service portfolios can be diversified, and consumer satisfaction can be maintained (Bengtsson et al. 1999, Quintana-Garcia and Benavides-Velasco 2004, Ritala and Hurmelinna-Laukkanen 2009). However, coopetition involves also risks and tensions (Bonel and Rocco 2007, Gnyawali et al. 2006, Gnyawali and Park 2009, Fernandez et al. 2014). Intra-organizational competition makes internal coordination process more complicated (Seran et al. 2016). According to Tsai (2002), in order to gain benefits from coopetitive strategy, units must to cooperate with each other and learn from each other. At the same time, the units are often compared based on their abilities for achieving results which cause units to become also competitors with each other (Tsai 2002). Units are prioritized by the parent company when it decides about resource allocation between the units (Boland et al. 2008).

To reduce or eliminate tensions and uncertainty, the company must properly coordinate different units. The coordination is a very important factor in achieving synergy benefits from cooperative organization. (Seran et al. 2016) Coordination can be divided into two different types: formal and informal coordination. According to Tsai (2002) formal coordination is based on a hierarchical structure, formalization, and specialization whereas informal coordination is based on voluntary and personal activities of coordination. Informal relations can be fostered through promoting horizontal activities between units (Tsai 2002). These, in turn, strengthen social relationships between units. Strong social relationships increase the trust between units and help to understand the behaviour of different units. (Seran et al. 2016) According to Laine et al. (2016b), social processes improve also collective sensemaking that, in turn, helps units to make right decisions also in cases of uncertainty using their intuition. However, collective sensemaking is more difficult when multiple units are involved. (Laine et al. 2016b) Cooperative tensions are obviously present in projects which include two or more units. However, they can be controlled through formal and informal coordination.

2.7 Summary

The focus on project management literature is moving from purely technical and operational tasks to the interaction of project participants (Sanderson 2012). Another change in project management literature is the change towards more flexible management (Hodgson 2004). Many studies argue that performance problems in large projects are caused by underdeveloped governance mechanisms which means that project participants are not able to provide flexible and strong response in unusual situation (Loch et al., Miller and Hobbs, Miller and Lessard, Morris, Winch, cited in Sanderson 2012). According to Nachbagauer and Schirl-Boeck (2019), mega project managers need to balance between direct control and a high degree of freedom. Similarly, Koppenjan et al. (2011) found that project can be managed in two different ways; with planning and control or with flexibility. Both Nachbagauer and Schirl-Boeck (2019) and Koppenjan et al. (2011) mention that the complexity of the project influences the ways in which project should be managed. They highlight the fact that complex projects are not predictable which increases the needs for a high degree of freedom, structures for communication, open information sharing, close cooperation between actors and broad task descriptions (Nachbagauer and Schirl-Boeck 2019, Koppenjan et al. 2011). Perminova et al. (2008) have similar thoughts. They found that the most important elements in managing uncertainty are reflective learning and sensemaking as they enable flexibility and rapidness in decision making situations (Perminova et al. 2008).

To conclude, project management of a complex project requires more communication and open cooperation between participants than a simpler project. However, formalized planning and control is still needed. Koppenjan's et al. (2011) framework cannot be used one-sided, but on the contrary, both approaches are needed. Problems in projects are usually so complex that project management must use strict control at some degree but at the same time enable flexible cooperation (Koppenjan et al. 2011).

3. MANAGEMENT CONTROL

3.1 Definition of management control system

Management control is defined as an attempt to influence employees' behaviour in the organization. Typically, it is management's control over other managers. (Fisher 1995) According to Giglioni and Bedeian (1974), there are two types of control in organizations. The first type is based on the manager's direction to subordinates in their workings. The second type relates to measurement and monitoring the performance of employees (Giglioni and Bedeian 1974).

Management accounting (MA), management accounting system (MAS) and management control systems (MCS) have sometimes been mixed between each other, which makes comparing of studies difficult (Chenhall 2003). Chenhall (2003) has put these terms in order on the grounds of the broadness of the term as illustrated in Figure 3. MA means practices, such as budgeting or product costing. MAS is a bit broader concept as it means systematic using MA practices to achieve some goal. MCS is even broader concept than MAS as it includes also control in cultural and administrative areas. (Chenhall 2003, Malmi and Brown 2008)

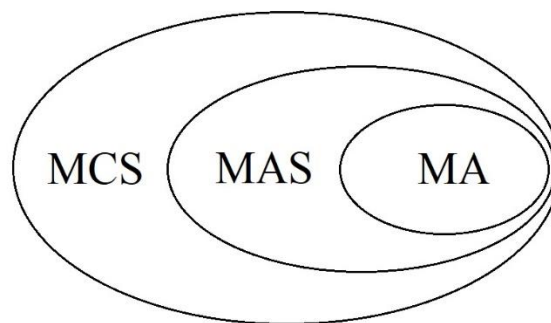


Figure 3. *Broadness of terms management control systems, management accounting systems and management accounting*

Simons (1995) defines MCS as routines and practices of managers to influence organizational activities. With the use of MCS, managers can delegate tasks more effectively and monitor the performance of their subordinates. In addition, MCS often helps to prevent major risks and catastrophes. (Simons 1995, see Davila and Foster 2007) According to Chenhall and Moers (2015), MCS is a collection of formal and informal controls as well as process and output controls which facilitate managers to achieve their targets. MCS has an important role in knowledge-sharing and communication (Ditillo 2012). It

can, for example, offer visibility to rules and routines, scalability to estimates and flexibility to an individual's roles and responsibilities (Laine et al. 2016a).

As indicated above, the concept of management control systems (MCS) is very broad and its definition differs a lot between studies (Malmi and Brown 2008, Fisher 1995). Malmi and Brown (2008) have connected previous research and clarified the concept of MCS. They have made a distinction between management control systems and management accounting systems. The main difference between these occurs in a way how systems are directing employee behaviour. If the system doesn't monitor how subordinate follow the goals that the manager has set, it is not a control system. Therefore, without monitoring aspect of the system, it can be called a decision support system or information system but not a control system. (Malmi and Brown 2008)

The difference is visible in the decision making. Using MCS, the manager can set targets for his or her subordinates and thus, the manager doesn't need to make decisions by herself. MCS supports subordinate's decision making so that he or she will make a good decision without the manager. This is based on the monitoring of subordinate's performance and behaviour. (Malmi and Brown 2008)

Malmi and Brown (2008) describe management controls as "systems, rules, practices, values and other activities management put in place in order to direct employee behaviour". If these management controls make a complete system, it can be called MCS. For example, a single rule (such as prohibition to travel in business class) shouldn't be called MCS. (Malmi and Brown 2008)

To make MCS clearer, concept "cost control" can be discussed as an example. Cost control can mean many different things. It can be a costing system, where an organization can see its costs. Hence, cost control is only made for information sharing to support decision making. This kind of cost control shouldn't be called MCS. Other kind of cost control appears when the manager requires its subordinates to report how well they are staying under the budget. This accountability makes subordinates to control their budget by themselves. Hence, this latter example can, with reason, be called MCS because the manager affects to subordinate's behaviour without giving any additional information for decision making. (Malmi and Brown 2008)

3.2 Management control system as an enabling system

Management control has been studied widely in mechanistic organizations which are usually associated with formal rules, standardized operation procedures, and routines

(Ahrens and Chapman 2004). Obviously, MCS is very effective in this kind of organizations. In contrast, according to Chapman (1997), MCS is assumed not to be very beneficial in organic organizations that are flexible and includes intensive, free-flowing communication. They, however, prove this claim not to hold true. Ahrens and Chapman (2004) say that organic communication would be more effective if it was combined with mechanistic procedures such as detailed project budgets.

Ahrens and Chapman's (2004) study shows that organizations are rarely purely organic or mechanistic. Hence, organizations have both coercive and enabling processes. If the process is coercive, it means that the user of MCS has limited options for action. Coercive processes are aiming to a foolproof system which has standardized procedures and strict rules. Enabling processes, on the contrary, gives users a possibility to use also their own intelligence. Processes don't need to be strictly defined but they should enable users to work more effectively also in uncertain situations. (Adler and Borys 1996, Ahrens and Chapman 2004)

MCSs are often considered as coercive and they are thought to be useful only for few people on the top of the hierarchy (Ahrens and Chapman 2004). Adler and Borys (1996) introduced four features of enabling formalization for workflows: repair, internal transparency, global transparency and flexibility. Ahrens and Chapman (2004) use these features to assess the enabling nature of MCS. These features are introduced in more detail below.

Repair

Repair of MCS refers to MCS's ability to fix possible breakdowns in control processes, preferably by users of a control system. (Ahrens and Chapman 2004). According to Adler and Borys (1996), repair is usually differentiated from routine operations if managers don't believe that their subordinates can deal with unexpected breakdowns. Adler and Borys give an illustrative example for this kind of situation: they say that in machining shops the machine control panel is often locked to prevent operators to change anything in part programs. However, locking of the control panel also prevents operators to fix issues that are causing unexpected breakdowns. Instead, they need to call the technician and just wait until the breakdown is fixed. Under these circumstances, operators will feel powerless and they won't even try to improve processes. The same approach of repair can be extended widely to other processes as well (Adler and Borys 1996)

MCS is coercive if it highlights every deviation from standard procedures. In other words, it measures how strictly subordinates follow the procedures defined for the process. Thus, procedures don't offer subordinates a help in identifying if the process is going well

or not. Also, they don't help subordinates to find improvement opportunities or to identify contingencies in their work. Enabling MCS, in contrast, allows users to affect their processes by themselves which encourages them to improve processes. (Adler and Borys 1996, Ahrens and Chapman 2004)

Internal transparency

Internal transparency is needed in MCS if the previous feature, repair, is enabling users to fix unexpected problems by themselves. Internal transparency provides users an understanding of processes and their functions as well as reasons of the rules which allows users to make better decisions in their work. However, users shouldn't be overloaded with unnecessary information, but they should be taken into discussions about processes affecting them. Internal transparency allows MCS to give feedback for users about their performance. (Adler and Borys 1996) It also highlights the most important processes and codifies the best practices. (Ahrens and Chapman 2004)

Budgeting process which is integrated with operation planning activities is one example of internal transparency of MCS (Ahrens and Chapman 2004). Transparency to both operations and budgeting give a better understanding for the budgeting process and highlights the most important matters affecting the budget.

Global transparency

Global transparency refers to the transparency of the whole system where users of MCS are working. It offers users an understanding of how their own doings affect the whole system. User's understanding of the whole system is a valuable resource. Budgets are often used to make organizational processes visible globally. However, senior managers are often the only persons who have access to these budgets of the whole organization. It might be beneficial to share budgets also with for example department managers. This would help them to prioritize their tasks according to significance to the whole system. Communication of important matters for departments would be easier if the budget could be used as an explanatory tool. This kind of use of budgets would enable different kinds of coordination, not only enhance hierarchical relationships. (Adler and Borys 1996, Ahrens and Chapman 2004)

Flexibility

Flexibility refers to MCS's users' discretion over the use of MCS. It means that users have a possibility to choose how they do their job. They can, for example, build different aggregations of performance information which support them to build understanding about circumstances in a better way. The flexibility of MCS can also allow organizing

management accounting so that it can provide expertise to also specific technical or commercial units and not only to certain lines or functions. (Ahrens and Chapman 2004)

Summary

If all these above-introduced features have been considered in characterizing MCS, it enhances user's understanding of the processes and gives them knowledge and desire to make improvement suggestions that might help the whole organization rather than only their own work. They should also be able to deal with unexpected situations such as breakdowns. With enabling processes efficiency and flexibility can both be improved simultaneously. (Ahrens and Chapman 2004)

3.3 Management control systems as a package

Malmi and Brown (2008) introduced a framework of management control systems as a package. The framework is developed to make discussions easier related to this subject. It includes five different types of control: planning, cybernetic, reward and compensation, administrative and cultural controls. Planning refers to creating a plan to achieve set targets. Planning can play a big role in directing subordinates' behaviour, which makes it as a part of MCS. Cybernetic controls include measurements, such as budgets, financial measures and non-financial measures. These measures help to set desirable plan and help to evaluate how well it is achieved. Reward and compensation controls are separated from cybernetic control as rewards can be given also by other reasons, such as cultural reasons. Administrative controls mean organizing employees and monitoring their performance in those specifically determined processes. Organization design and structure, governance structures, and the procedures and policies are all parts of administrative controls. Cultural aspects can be controlled by many means. For example, defining the company's values, dress-code for employees or by means of trainings. (Malmi and Brown 2008)

Cultural Controls						
Clans		Values			Symbols	
Planning		Cybernetics Controls				Reward and Compensation
Long range planning	Action planning	Budgets	Financial Measurement Systems	Non Financial Measurement Systems	Hybrid Measurement Systems	
Administrative Controls						
Governance Structure		Organisation Structure			Policies and Procedures	

Figure 4. Concept of MCS package (adapted from Malmi and Brown 2008)

These all parts of controls are included to MCS package so that managers can make sure that the activities and behaviour of their subordinates are following the organization's targets and goals. The structure of MCS package is made around controlling activities. It includes the tools, systems and ways of working so that managers can direct employee behaviour. (Malmi and Brown 2008). However, Bedford et al. (2016) found that all management control practices are not relevant or useful in every situation. In many cases, MCS would be as effective with a single isolated control practice than without it. (Bedford et al. 2016)

Strategies of firms influence the ways of using MCS. Often firms that are conservative and reach into cost leadership and efficiency focus on financial figures. Conversely, firms based on innovation or product differentiation often use accounting information in an interactive way. They also have organic organization structures and their performance-based pay is more subjectively determined. Controlling of this kind of firms is not so formal and it emphasizes more cultural controls. (Bedford et al. 2016) MCS is built so that it requires employees to handle the contingencies in their work by themselves as it only directs employees' behaviour in the right direction. Hence, it needs a lot of communication and interaction in many levels of company's hierarchy to work. (Chenhall and Moers 2015)

3.4 Management accounting information in decision making

The purpose of management control is to facilitate decision making in different situations. It should make decision situations understandable for decision makers and offer insights from the financial aspect. Management accounting (MA) information is one of the outcomes of MCS. According to Saukkonen et al. (2018) MA information can have many roles. It can be "an answer machine" or a source of inspiration (Burchell et al. 1980). With the help of accounting information, managers can more easily to define their roles and responsibilities in the organization (Laine et al. 2016a). However, it doesn't often

support managers in an appropriate way. Managers might think MA information as irrelevant or useless for them. (Saukkonen et al. 2018)

MA information can be divided into two different approaches: Analytical and actor-based information (Arbnor and Bjerke 2008, Nielsen et al. 2015, see also Saukkonen et al. 2018). According to Saukkonen et al. (2018), analytical approach assumes that MA information is available and that it is comprehensive. The decision would be made rationally based on this information. This approach has a clear process. First, problem recognition is made. Then, data is collected, and finally analysed. An actor-based approach is based on the interaction between managers and other participants. Purpose of the interaction is to make different managers' opinions clear to other managers. This way, managers can merge their thoughts and get everyone's insight into the discussion. The actor-based approach considers that there are usually many decision makers in the process. These decision makers often have different intentions towards the decision. In addition, all of them have slightly different know-how regarding the situation. Communication prevents different participants to conflict with their viewpoints and preferences as everyone would be on track with others' preferences. Communication also makes people to communicate their know-how to other participants which facilitates decision making. (Saukkonen et al. 2018)

Even if analytical and actor-based approaches are separated to different approaches, they are not totally separated in real-world (Nielsen et al. 2015, Saukkonen et al. 2018). For example, the actor-based approach can have a systematic process with certain steps in the same way as an analytical approach. Thus, they can occur in different forms and they can also be combined with each other. (Saukkonen et al. 2018)

Participants of decision making process usually have different access to information and they also define the decision-making process and problem differently. Different access to information naturally affects to the final preferences for a decision of every participant. In the actor-based approach, the process of decision making includes the interaction of participants in a way that everyone should be able to tell their own opinions and interests. Decision making is often made in a very complex setting where participants have different information and interests compared to others. MA information can help in these situations to increase interaction and common sensemaking between participants. Using of MA information can be outstandingly important in discussions between people from different organizational functions. (Saukkonen et al. 2018, Laine et al. 2016a)

Saukkonen et al. (2018) say that an organization should have enough expertise in MA tools to utilize MA information in an appropriate way in decision making. Without expertise in MA tools, managers' responsibilities and objectives are harder to change into financial figures. However, MA information is never perfect, and it can always be improved. In the case study of Saukkonen et al. (2018) lack of expertise in MA tools led to excluding critical parameters from calculations which distorted the decision-making situation. Therefore, in that situation the decision didn't follow the strategy of the company. (Saukkonen et al. 2018)

Managers' interaction could leave out discussion about taken-for-granted assumptions. It might also leave out reflection on unusual solutions or alternatives. (Saukkonen et al. 2018) Accounting information can improve interaction in the organization and make it more efficient (Laine et al. 2016a). Interaction in using MA information directs attention on strategic uncertainties and renewal. It enables strategic innovation by conversations and dialogs in the organization. Practices should be simple and understandable so that senior or operational managers could easily use them to update action plans if needed. (Chenhall and Moers 2015) If MA information is used mainly in routine decisions, it probably can't inspire to new solutions or alternatives. In Saukkonen's et al. (2018) study, sustainability was one of the main things in the case company's strategy. However, as MA information was usually used only in routine decisions, it couldn't take sustainability into account in a proper way which led to bad decisions related to sustainability. As can be noticed from this example, managers need MA information in different forms and contents in different situations. Because of this, actor-based decision making could be a solution as it could increase awareness of different managers' interests related to MA information. (Saukkonen et al. 2018)

3.5 Summary

MCS is defined as routines and practices of managers to influence organizational activities (Simons 1995). According to Chenhall and Moers (2015), MCS is a collection of formal and informal controls as well as process and output controls which facilitate managers to achieve their targets. MCS has also an important role in knowledge-sharing and communication (Ditillo 2012). According to Malmi and Brown (2008) management control system differs from a decision support system or information system because it also monitors how well the set targets are followed. If monitoring is done right, actors are able to make the right decisions without their manager's help (Malmi and Brown 2008). Because MCS is built so that it requires employees to handle the contingencies in their work

by themselves, it needs a lot of communication and interaction in many levels of the company's hierarchy to work. (Chenhall and Moers 2015)

Malmi and Brown (2008) introduced a framework of MCS as a package. This framework shows clearly different aspects that can be involved to MCS. Based on the framework, MCS isn't only accounting system, it rather is a comprehensive management system because in addition to planning and cybernetics controls, it can include also cultural controls, such as company values, and administrative controls, such as governance structure. To ensure that actors follow the organization's targets and goals, an accounting system isn't enough. That is why MCS package includes different aspects so comprehensively. (Malmi and Brown 2008) However, Bedford et al. (2016) found that all management control practices are not relevant or useful in every situation. In many cases, MCS would be as effective with a single isolated control practice than without it. (Bedford et al. 2016)

MCS is considered as coercive if its users have limited options for action. On the contrary, MSC is experienced as enabling if it enables users to use their own intelligence in fixing problems. (Ahrens and Chapman 2004). Managers often think that management accounting information isn't relevant for them (Saukkonen et al. 2018). Enabling MCS would provide internal and external transparency of MCS, which would help managers to understand better how they can utilize management accounting information (Ahrens and Chapman 2004). Thus, they could use MA information more widely. MA information would also help to define roles and responsibilities in the organization (Laine et al. 2016a).

MA information is one of the outcomes of MCS. In large projects, MA information is not always available and large projects have always more than one decision maker. The actor-based approach of Saukkonen et al. (2018) assumes that the process includes many decision makers and is thus suitable in large projects. The actor-based approach emphasizes the need to make opinions clear to other managers by the interaction between them. MA information can help in these situations to increase interaction and common sense-making between participants especially when participants are from different functions. (Saukkonen et al. 2018) Practices to use MA information should be simple and understandable so that senior or operational managers could easily use them to update action plans if needed (Chenhall and Moers 2015).

4. THE ROLE OF CONTROLLER

4.1 Working as a part of a project team

Role structure of temporary organizations, such as project organizations, coordinates, enables and constrains work activity. Definition of a role can be approached from two perspectives. From a structural perspective, a role is tasks, norms, and expected behaviour. Conversely, interactionist perspective suggests that individuals can influence their own role by social interaction. Thus, role structures are a framework for a role, but the role is constructed by every individual on their own. (Bechky 2006)

If ambiguities about roles in organization increase, coordination becomes more complex. Coordination in this context means managing dependencies among activities. In projects, coordination is more difficult as organizations are temporary. (Bechky 2006) To confirm this claim, Sanderson (2012) claim that performance problems in large projects are often a result of governance problems. Without well-developed governance mechanisms, project participants are not able to sufficiently respond inevitable turbulence (Loch et al., Miller and Hobbs, Miller and Lessard, Morris, Winch, cited in Sanderson 2012).

Project teams are often cross-functional which increases the complexity of projects. In contrast, cross-functionality can also offer complementary skills and knowledge to the organization. However, to utilize these positive impacts of cross-functionality, teams must be able to collaborate with each other. Collaboration is the key to distributing skills and knowledge among project members. The ways how project members work together are shaped by their relationships with each other. Trust between project members is thus particularly important. Trust is needed in complex projects as project members rely on the expertise of their colleagues in many ways. Trust has an important role in developing work processes and successful performance. However, trust is not easy to adopt in temporary projects as people don't necessarily know each other beforehand. If project members don't have prior experience working with each other, it is difficult for them to evaluate each other's trustworthiness. In addition, projects usually have high time pressures which make it difficult to prove one's trustworthiness during the project. Hence, trust is an important aspect of project performance, but it is challenging to achieve in project teams. (Buvik and Rolfsen 2015)

The prior experience between project members may have a significant effect on trust and can be an important factor at the beginning of the project. Project members may have already constructed social relationships with each other. The trust between project

members helps in processes such as “the early establishment of integrative work practices, development of a common philosophy, open communication, clear role expectations, and a shared climate of trust within the team.” (Buvik and Rolfsen 2015)

Frow et al. (2005) found that project team members try to cooperate informally where possible. Formal procedures can be used to strengthen these informal ways of interactions. Formal procedures provide a framework for cooperation between project member and help to create a shared understanding of requirements and how they can be achieved. Formal procedures are also used if informal ways are not feasible. For example, when people are meeting for the first time or they cannot meet face-to-face. Formal procedures are also used as a backup if an informal way of cooperation doesn't work. Complementary use of formal and informal procedures is critical in situations where participants are trying to achieve their own individual targets which differ from each other. (Frow et al. 2005)

4.2 A controller is in between different units and functions

In large organizations, certain employees are hired to work with management control systems. They are called as controllers, management accountants, or financial managers (Armstrong, Ezzamel and Burns, Granlund and Lukka, Hopper, Lambert and Sponem, Simon, Vaivio, see Goretzki and Messner 2018). This group of specialists may have a lot of responsibility for control in an organization. (Goretzki and Messner 2018) This thesis discusses the role of controller of large projects. According to Burström et al. (2013) project controllers can be demanded to provide different measurements, such as project cost or profitability measurements. In addition, they often have various informal roles as well (Burström et al. 2013).

Organizations have always different interfaces or boundaries that are facilitating or enabling interaction between actors. These boundaries are needed in an organization to function. Shared understanding between different business units or functions is difficult to achieve without boundaries. For example, management reporting structure defines boundaries between business units which help actors to understand how they are connected to other business units and how they could cooperate with each other to make better results. (Laine et al. 2016a)

Laine et al. (2016a) emphasize activities between different domains, especially in accounting development. They make activities at boundaries more understandable by using terms *boundary object* (Carlile 2002, Briers and Wai 2001) and *boundary subject*

(Huzzard et al. 2010). Boundary object helps different stakeholders to get a shared understanding of a certain issue. For example, project cost estimation spreadsheet can be a boundary object between cost estimator and project manager. Boundary subject, in turn, can be a person at the organizational boundary. Controller, for instance, can be a boundary subject between a project manager and a treasury manager. Boundary objects help to reveal uncertainties and ambiguities and they also highlight central business impacts. Boundary objects and boundary subjects can improve the holistic and integrative understanding of participants' viewpoints. They can also help to make accounting more effective and focused. (Laine et al. 2016a)

In cross-functional projects, there are challenges to get people to communicate and work efficiently together because people have different backgrounds, skills, knowledge, and competences. Although the position of project controllers doesn't usually provide formal power or authority, they are often acting in between different actors facilitating communication. (Burström et al. 2013) Hence, based on Laine's et al. (2016a) study, this kind of project controller is a boundary subject and he or she can be used as a "communication platform". Boundary subject can help in getting shared understanding about different roles and responsibilities of the organization and bring different actors closer to each other. (Laine et al. 2016a)

Project controller can use boundary objects as helping devices at the boundaries. In practice, boundary objects can highlight the most important business impacts and help actors to understand uncertainties and ambiguities of different accounting facts. Boundary subjects, such as project controller, might help actors to lighten boundaries and thus bring actors closer to each other. Boundary objects and boundary subjects are supplementary. Even if boundary objects work well, boundary subjects are needed for different purposes. Boundary objects and boundary subjects help to form a shared understanding of different actor's roles and responsibilities. They also help to understand the information needs of actors. (Laine et al. 2016a)

Obviously, project controllers have both formal and informal roles. The formal role emerges from organizational expectations, structures, and planning. Conversely, the factors of informal roles are norms, context and social interaction. (Burström et al. 2013)

The formal role of project controller is to work with issues such as product cost, project cost and profitability measurements. However, the informal role of project controllers could be surprisingly significant. Project controllers could have a boundary acting position which could be defined as an informal liaison role. (Burström et al. 2013, Laine et al. 2016a) In the study of Burström et al. (2013), informal liaison roles of project controllers

are divided to five different activities: peacekeeping, probing, nailing, process implementation and streamlining. Peacekeeping role of project controller appears when project team members are not able to agree with each other. Probing means that project controllers need to create a clear picture of the situation. Hence, project controllers need to collect and analyse information and interact with various stakeholders. Nailing means that project controller, for example, connects certain technological solutions with financial figures. Nailing cost follow-up responsibilities to different actors is natural to project controller, who usually have a clear picture of responsibilities in the projects. Process implementation role of project controller means filling the gap between strategic intentions and their implementations in practice. Project controllers need also to streamline operations that are changing constantly as streamlining reduces operational uncertainty. (Burström et al. 2013)

When the project controller needs to streamline operations (Burström et al. 2013), he or she could construct accounting prototypes (Laine et al. 2016a). They can be constructed as communication platforms. "Accounting prototypes are jointly and iteratively created preliminary tools, e.g. cost accounting spreadsheets or accounting information systems under development." Accounting prototype can increase communication as it facilitates social interaction between actors who participates to the development process. In addition to communication, constructing different accounting prototypes facilitates choosing, constructing, and elaborating relevant accounting information. Constructing different accounting prototypes could benefit from the use of boundary objects and boundary subjects because they can help to form a detailed process that aims to connect the viewpoints of different actors. (Laine et al. 2016a)

The informal roles of project controllers are not planned beforehand, and the organization doesn't demand them officially. Instead, they arise from social interaction, personal skills and contextual aspects as well as from formal roles. However, the importance of informal liaison role should be identified by managers as the role is crucial in facilitating communication and coordination of work which, in turn, help to avoid coordination breakdowns and inter-organizational communication interruptions. (Burström et al. 2013)

According to Burström et al. (2013) project controller should be understood as a proactive dynamic actor who stretches far beyond traditional work, rather than an actor who distantly supervises and controls. (Burström et al. 2013) Also, Laine et al. (2016a) say that if controllers participate actively in designing and utilizing of organizational boundaries, it would be easier for them to take the role of an active business partner. Especially, it would help to get the desired communication in solving complex business problems. In

this regard, the controller should clarify involved actors' values and valuation. The controller as a business partner could offer firmness and flexibility to the organization. (Laine et al. 2016a)

4.3 A controller as a business partner

In recent years, there has been a lot of discussion about the role of controllers in the literature. Controllers are often seen as number crunchers who manage accounting systems. Now, shifting the role towards business orientation has been in discussions. (Järvenpää 2007, Laine et al. 2016a, Burström et al. 2013) This means being the active partner of management who can give advices and participate in decision making. Hence, business orientation means that management accounting (controller) is willing to provide more value-added for management and that he or she also has abilities to do that. (Järvenpää 2007)

To help business decisions with increasingly better control, new management accounting techniques have been developed. Activity-based costing (ABC), balanced scorecard (BSC), life-cycle costing and target costing to mention few of them. (Järvenpää 2007) Implementation of these innovations could affect to business orientation as such (Friedman and Lyne, Vaivio, see Järvenpää 2007). Modern financial and operational control systems, such as ERP, could affect the role of management accounting function (Granlund and Malmi 2002, Scapens and Jazayeri 2003). This effect arises from the ability to handle routine tasks faster and more effectively than earlier (Järvenpää 2007). Because of these modern financial systems, controllers are now trying to develop their roles in a certain direction. Especially, they tend to search for new responsibilities and a new identity. One example of the new role is called *business partner*. (Goretzki and Messner 2018) Role of business partner refers to a stronger business orientation of the controller. A business-oriented controller can give more value-added for management's decision making and control. (Järvenpää 2007)

In the literature, most of the studies suggest that business orientation would increase the value of controllers (e.g. Järvenpää 2007, Laine et al. 2016a, Burström et al. 2013). According to Goretzki and Messner (2018), it also strengthens the controller's standing in the organization. Many controllers are now trying to attain such a role. However, the role of a business partner is not easy to adopt. (Goretzki and Messner 2018) It is not obvious that operational managers would support the change of the controller as they often want to keep the work in their own hand (Ezzamel and Burns, Lambert and Sponem, Morales and Lambert, Vaivio, see Goretzki and Messner 2018). Therefore, the success of adopt-

ing the role of business partner mainly depends on the controller's relationship with operational managers. Operational managers' expectations and attitudes, as well as reactions, are all important factors in a situation where the controller is trying to attain business-oriented role. (Morales and Lambert, Vaivio, see Goretzki and Messner 2018) One essential device towards controllers' business partnering role is decentralization of management accountants so that they become part of business units (Granlund and Lukka, cited in Järvenpää 2007). In Järvenpää's (2007) study, business controllers were in the same management accounting team in the beginning. Then, they were moved next to business managers which enabled a lot more information from business in an informal way. This was an accepted action by both management accountants and business managers. (Järvenpää 2007) Nevertheless, operational or business managers are not the only stakeholders that are influencing the role of controller. All the actors, that the controller is working with, influence how the controller is seeing the role of a business partner. (Goretzki and Messner 2018)

Goretzki and Messner (2018) also found that formal changes of controllers' job description towards business orientation may leave controllers insecure and uncertain feeling of their role. A better way to enhance the business orientation of controllers is to create enough space for them to enabling controllers to become business partners in an informal way by themselves. (Goretzki and Messner 2018)

4.4 Summary

It is important that project organizations have well-developed governance mechanisms, especially in large projects (Sanderson 2012). Controllers have often a crucial role in the boundaries between different business units or functions. Based on Laine's et al. (2016a) study, the controller can be seen as a boundary subject in the boundary whereas for example project cost estimation spreadsheet can be seen as a boundary object. Boundary subjects and boundary objects help to reveal uncertainties and improve holistic understanding of different participants (Laine et al. 2016a).

Controllers have both formal and informal roles. However, Burström et al. (2013) found that the informal role of controller could be surprisingly significant. This may emerge from the fact that project team members try to cooperate informally where possible (Frow et al. 2005). Burström et al. (2013) found that project controller, for example, ensures peacekeeping among project team, create the big picture of the situations, determines cost follow-up responsibilities, ensures that processes are implemented according to

strategy, and streamline operations. These are often things that are not demanded officially. Hence, the controller often needs to stretch far beyond traditional work. (Burström et al. 2013)

Controllers are trying more and more to adopt the role of a business partner. (Järvenpää 2007, Laine et al. 2016a, Burström et al. 2013) The business orientation of controller would increase their value-added for management's decision making and control. (Järvenpää 2007) Role of a business partner is not easy to adopt (Goretzki and Messner 2018). It depends on controller's relationship with the operational manager and their desire to keep the work in their own hands (Ezzamel and Burns, Lambert and Sponem, Morales and Lambert, Vaivio, see Goretzki and Messner 2018). The role of a business partner is easier to adopt without formal job descriptions. The controller can become a business partner by him or herself if he or she gets enough freedom. (Goretzki and Messner 2018)

5. THEORETICAL FRAMEWORK FOR MANAGING LARGE PROJECTS

Literature is more and more emphasizing flexibility and interaction in large projects and management control systems. Project management literature emphasizes the importance of interaction and flexibility (Loch et al., Miller and Hobbs, Miller and Lessard, Morris, Winch, cited in Sanderson 2012). However, strict control isn't forgotten. According to project management literature, standardized processes and strict control can be combined with flexibility. (Koppenjan et al. 2011, Perminova et al. 2008)

MCS literature is more and more emphasizing MCS as a communication device (Ditillo 2012, Laine et al. 2016a, Saukkonen et al. 2018). Similarly, as project management literature, MCS literature has also discussed the flexibility of processes (Adler and Borys 1996, Ahrens and Chapman 2004). Based on Ahrens and Chapman's study (2004), MCS can have enabling nature which means that its users can choose how to perform their tasks and they can also improve processes independently. This freedom of employees can enhance their understanding of processes which help them to deal with unexpected situations (Ahrens and Chapman 2004).

In the literature, also the role of the controller has arisen as a communication device between different functions (Laine et al. 2016a, Burström et al. 2013). Controllers are often seen as number crunchers who manage accounting systems (Järvenpää 2007). However, the role of controllers is shifting towards the role of business partner (Järvenpää 2007, Laine et al. 2016a, Burström et al. 2013). Controllers often act in boundaries between functions or units where they act as facilitators of communication and help actors to get shared understanding (Laine et al. 2016a, Burström et al. 2013).

The literature emphasizes the fact that complex projects are not predictable which increases the needs for a high degree of freedom, structures for communication, open information sharing, close cooperation between actors and broad task descriptions (Nachbagauer and Schirl-Boeck 2019, Koppenjan et al. 2011).

Many studies argue that performance problems in large projects are caused by under-developed governance mechanisms which means that project participants are not able to provide flexible and strong response in unusual situation (Loch et al., Miller and Hobbs, Miller and Lessard, Morris, Winch, cited in Sanderson 2012). If ambiguities about roles in organization increase, coordination becomes more complex. Coordination in this context means managing dependencies among activities. (Bechky 2006) Hence, roles and

responsibilities should be developed so that project participants can act even in unusual situations.

Based on the literature review above, a theoretical framework can be created for managing large projects. The framework is illustrated in Figure 5. The framework tries to consider the main issues that affect the successfulness of large and complex projects. Based on the framework, all four issues should be considered in managing large projects to prepare for unusual situations in the project.

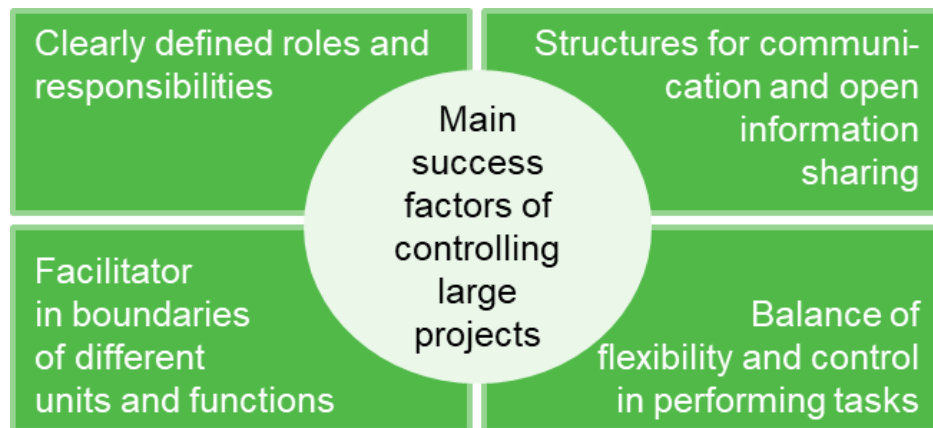


Figure 5. *A theoretical framework to manage large projects*

To summarize the framework in a form of instructions, all four parts of it are discussed:

Roles and responsibilities should be defined so that project participants can act even in unusual situations. If ambiguities about roles in organization increase, coordination becomes more complex (Bechky 2006).

Communication is a very important factor in managing large projects. Based on literature review, problems in communication is the biggest problem in large projects. Thus, the organization should provide good structures for communication and enable open information sharing throughout the organization.

Facilitator in boundaries is needed because in cross-functional projects, there are often difficulties to get people to communicate and work efficiently together (Burström et al. 2013). In practice, the role of the controller should be business-oriented so that he or she can understand and support business comprehensively.

The flexibility of actors means that they are free to choose how to perform their tasks. Flexibility is needed in unpredictable situations which are common in large and complex projects. In large projects, balancing between flexibility and control is a critical issue of project management (Koppenjan et al. 2011, Perminova et al. 2008).

6. METHODOLOGY

6.1 Research philosophy and approach

Research philosophy, approach and design of this thesis are illustrated with the help of “research onion” (Saunders et al. 2016, p. 124) in Figure 6. Research onion is a diagram which helps to understand certain choices in the research process. A researcher should start with outer layers of research onion and then move towards the center of the diagram, layer by layer. Every layer has its own purpose in research design. Outermost layer considers research philosophy and the second layer from outside makes the researcher think his research approach. Inner layers relate to research design in more detail. (Saunders et al. 2016, p. 122-124) Choices of these layers are next discussed in detail.

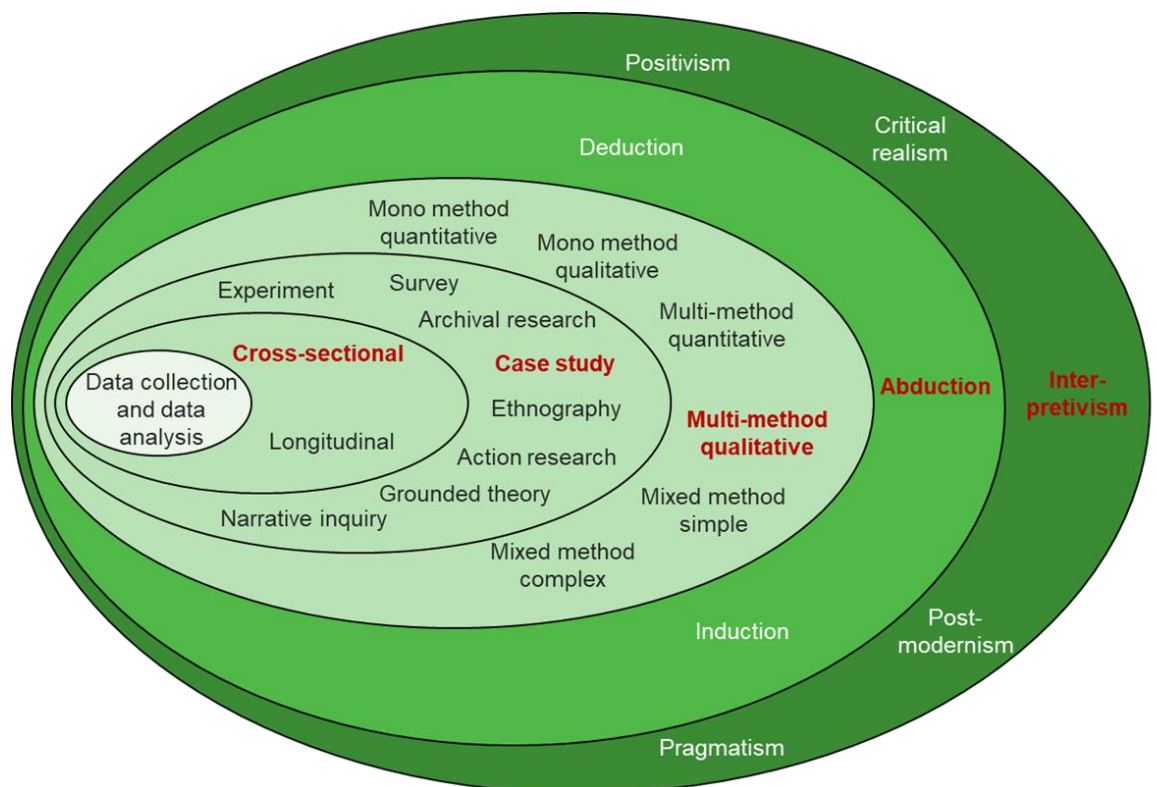


Figure 6. Research onion illustrates the research design of this thesis (adapted from Saunders et al. 2016, p. 124)

The research philosophy of this thesis is *interpretivism*. This philosophy emphasises that people cannot be studied as physical phenomena because they create meanings. Hence, studying people differs a lot from natural science research. People observe the

world differently which makes them create different meanings and social realities. Interpretivism tries to look at organizations from the perspectives of different groups of people. Different perspectives enrich the understanding of studied phenomena. Because interpretivism takes so many interpretations, meanings and complexities into account, it is clearly subjectivist. If the researcher wants to dive into the social world of the research participants and get a good understanding of their thoughts, his or her findings are inevitably subjective. However, the researcher must recognise that his or her subjectivity plays a crucial role in interpretations of research materials and data. (Saunders et al. 2016, p. 140-141) In this thesis, the researcher is working in the target company during the research project and knows many of the research participants beforehand. Financial processes in the target company are studied through different stakeholders' opinions towards them. The researcher attempts to make conclusions of financial processes based on different viewpoints of research participants.

The approach of theory development in this thesis is an *abduction*. It combines deduction and induction which means that it moves back and forth between them (Suddaby 2006). Deduction refers to theory development before empirical testing whereas induction approach refers to collecting data to explore phenomenon before building theory (Saunders et al. 2016, p. 144-147). In this thesis, theory and data collection are made simultaneously so that on the one hand, the theory might affect to data collection such as interview questions and on the other hand, empirical results might affect theory development. The research process is illustrated in more detail in chapter 6.4.

6.2 Research design

Purpose of research design in this thesis is to make research explanatory. Explanatory research attempts to establish causal relationships between variables (Saunders et al. 2016, p. 176). This thesis attempts to get a clear picture of the current state of financial processes and causal relationships in them. It also tries to suggest how they can be improved.

The thesis is a *case study* of a specific topic. A case study gives an in-depth understanding about a certain topic and it is studied in a real-life setting (Yin, cited in Saunders et al. 2016, p. 184). It studies the topic at a particular time so it can be called *cross-sectional* study which means that it takes a "snapshot" from certain time horizon (Saunders et al. 2016, p. 200). The 'case' in this thesis is relating to financial processes in the target company.

This thesis is made as a *multi-method qualitative* study because appropriate quantitative material is not easy to obtain regarding financial processes. Qualitative research design has often a connection to interpretive philosophy (Lincoln and Denzin, cited in Saunders et al. 2016, p. 168) because researcher needs to understand subjective and socially constructed meanings of research participants. Qualitative research can be done using different data collection and analysing techniques. Data collection is usually not standardized which means that interview questions and other data collection procedures can change during the research project. (Saunders et al. 2016, p. 168)

6.3 Research process

According to Saunders et al. (2016, p. 11) research project usually starts with formulating and clarifying a research topic. In this case, the case company ordered research on a certain topic. Researcher, however, had to discuss with research participants informally before he was able to clarify research questions and objectives. The researcher made four interviews prior to finding literature in order to clarify what kind of literature should be searched. Literature and interviews were made partly at the same time because the information from interviews was needed to be able to gather suitable theory from the literature.

Interviews conducted between January and March (11 interviews) revealed challenges mainly in cost estimation and project opening phases. Thus, results regarding these were written between February and April. Also, process description (Appendixes B and C) regarding roles and responsibilities in sales and opening phases were outlined at the same time. The following interviews weren't conducted directly after previous ones, because the intention was to gather knowledge and understanding about the topic before the next interviews. The next interview round, including 11 interviews, was conducted in May and June. These interviews revealed the reasons behind the challenges of currency hedging and contract structure definition. Results from these interviews were written in May and June. Thus, the main results of the thesis changed many times during the process.

When literature review, methodology, and results sections were mostly done, discussion chapter was written. Then, finally, the introduction and conclusions were written.

6.4 Data collection

Data collection of this thesis is done through two different data collection methods: semi-structured interviews and from secondary data sources. Because the researcher works

in the target company during the research process, it is obvious that he will get information from many other sources than only from interviews. Other sources of information in this thesis are informal discussions with employees of the target company and different kinds of internal documents. Internal documents are for example PowerPoint slides of project meetings and internal email conversations. According to Saunders et al. (2016, p. 206-207), using more than one method of data collection or data source is called triangulation. Purpose of triangulation is to ensure that collected data is “what you think they are telling you” (Saunders et al. 2016, p. 207). If research philosophy is interpretivism, as in this thesis, triangulation adds value by adding depth, breadth, complexity and richness of the research (Denzin, Lincoln and Denzin, cited in Saunders et al. 2016, p. 207).

Interviews

As mentioned, interviews were held mainly as semi-structured interviews. However, the first four interviews were informal unstructured interviews to gather general knowledge about the area of the study. The knowledge gathered from these first interviews were the basis for following semi-structured interviews. Semi-structured interviews were prepared with clear themes and some key questions. Interviews proceeded as is illustrated in Saunders et al. (2016, p. 391): order of questions varied depending on the flow of conversation and additional questions were asked if needed. Additionally, the interviewee was allowed to tell quite freely other relevant matters which he or she found important.

Interviewees are listed in Table 2. Interviewees were chosen by purposive sampling, which means that the researcher had to use his own judgement in choosing interviewees (Saunders et al. 2016, p. 301). This was the only alternative because not so many people have enough knowledge about the topic of this thesis. The group of interviewees include people from very different positions. The purpose was to get a comprehensive understanding of financial processes from different people’s perspectives. Especially, the aim of interviews was to figure out how interviewees see the role of mega controller and what processes mega controlling includes and are there any improvement possibilities.

Table 2. *Interviews made for this study*

Date	Interviewee	Job title	Type of inter- view
30.1.2019	1	Senior Manager, Treasury	Unstructured
31.1.2019	2	Business Controller (Mega Controller)	Unstructured
5.2.2019	3	Business Controller (former Mega Control-	Unstructured
6.2.2019	4	Sales Director	Unstructured
5.3.2019	5	PMO Director	Semi-structured
8.3.2019	6	Business Controller (former Mega Control-	Semi-structured
11.3.2019	7	Project Director	Semi-structured
14.3.2019	8	Project Controller	Semi-structured
15.3.2019	9	Controller, Trade Finance	Semi-structured
15.3.2019	10	Sales Director	Semi-structured
18.3.2019	11	Cost estimator	Semi-structured
26.3.2019	12	Director, Supply and Category Management	Semi-structured
10.5.2019	1	Senior Manager, Treasury	Semi-structured
20.5.2019	13	Legal Director	Semi-structured
21.5.2019	14	Tax Director	Semi-structured
11.6.2019	15	Project Controller	Semi-structured
12.6.2019	16	Project Controller	Semi-structured
12.6.2019	4	Sales Director	Unstructured
14.6.2019	17	Cost estimator	Semi-structured
18.6.2019	18	Business Controller	Semi-structured
19.6.2019	19	Director, Trade and Export Finance	Semi-structured
19.6.2019	20	Trade Finance & Cash Management Expert	Semi-structured

After the first four interviews, the literature search was made. Then, based on literature and prior interviews, interview structure (Appendix A) were made for semi-structured interviews. Interview structure was modified a bit between interviews, but the main themes remained the same.

Most of the interviews were held face-to-face although interviewee 1 and 4 were interviewed through Skype. Interviews were recorded and the researcher made notes from the recordings afterwards.

Secondary data

Secondary data used in this thesis include different internal documents such as PowerPoint slides of project meetings and internal email conversations. PowerPoint slides and email conversations were shared to the researcher by interviewees and instructor of the thesis. Also, the case company's internal system, so-called Direction handbook, was used to gather information about processes and responsibilities.

6.5 Reliability of the research

Reliability is a central factor of research quality. It is traditionally determined based on replication and consistency. In other words, research can be thought as reliable if it can be replicated so that results are the same. However, research is not always meant to be replicable as it might depend on social interpretations at a certain moment. (Saunders et al. 2016, p. 201-205) This research is that kind of research as it cannot be replicated because of social interpretations.

According to Collingridge and Gantt (2008) reliability of research is good if the study is made with research methods that are generally accepted among researchers. They think that research doesn't need to be replicable. Reliability of research depends on the research methodology used. Usually, reliable qualitative research can give similar results only if research is conducted in the same way and with the same sample group of people. Even in this situation, two researchers don't necessarily get the same results, but research may still be reliable. It just means that researchers may have a slightly different understanding of the topic. (Collingridge and Gantt 2008) To minimize negative factors of reliability, the researcher must ensure that the research process is assessed thoroughly, and it doesn't include erroneous assumptions (Saunders et al. 2016, p. 201-205).

Based on previous perspectives of reliability, this thesis can be argued to be reliable. Reliability of this thesis is increased by using generally accepted research methods (introduced above) and by reporting the research process transparently. Replicability of this study may not be very good, as this thesis concentrates research participants' current opinions about the research subject area.

7. FINANCIAL PROCESSES IN MEGA PROJECTS

7.1 Overview

The case company has projects of many sizes. Smaller projects are simpler to coordinate and manage, but larger projects have more elements influencing them. In the case company, the largest and the most critical projects are called mega projects or MUP projects (multi-unit projects). Definitions mega project and multi-unit project are often used as synonyms. Because these definitions are not documented very well in the case company, their meanings are good to illustrate here. Definition of MUP project isn't found from the case company's database, but it is straightforward. MUP project means a project where multiple units are involved. Definition of mega project, on the contrary, is documented in the case company's internal handbook. Nominated area sales manager concludes if the sales project is a regular or mega project. The project can be concluded to be a mega project if fulfils certain characteristics. In the case company, mega projects are usually multi-unit projects that cost over 100 million euros.

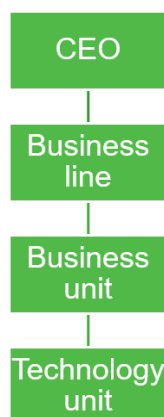


Figure 7. Organization hierarchy in the case company

The case company has four business lines (organization hierarchy illustrated in Figure 7). Mega projects often include deliveries from more than one business unit. Because of the involvement of many stakeholders, mega projects are usually very complex. Mega projects are not very regular which probably increases the complexity as well. As Geraldi (2008) says, projects are not very structured in the beginning. Responsibilities are not clear, cooperation forms are not clear, and project members don't know each other's working styles (Geraldi 2008). Frequency of selling mega projects in the case company varies a lot and sometimes there can be over a year between sales of mega project.

Mega projects are large, and they can, therefore, involve hundreds of people who work with the project. As mentioned above, mega projects are usually made in cooperation with two or more business units. However, business units often drive mainly their own benefits and results so cooperation between them needs coordination. Business units may, for example, have a different opinion about how profit margin is shared between them. In addition to many business units, there are always many different countries involved. The case company has locations in many countries and its customers are mainly in foreign countries.

Because of the complexity and importance of mega projects, they have more strict processes in the case company than other projects. Mega projects have for example mandatory management audit meetings (introduced in chapter 7.2) and nominated sales director who coordinates and consolidates proposal development. However, clear process description isn't found for financial processes of mega projects in the case company. The aim of this thesis is to create a process description to clarify and improve the processes of mega project. The aim is also to define and clarify the roles and responsibilities of actors who participate in financial processes. However, this thesis doesn't consider all financial processes in mega projects, but it tries to consider the most critical financial processes influencing especially sales and opening phases of the project (phases of mega project is illustrated in Figure 8).



Figure 8. *Phases of mega project*

In the sales phase of mega project, cost estimations are needed to assess if the project is worth of selling. Cost estimates are used as a basis for contract price so they would thus have a dramatical effect on profitability if they were calculated wrongly. Luckily, the cost estimation process as such works well in the case company. However, cost estimations don't always provide all relevant information for internal financial processes. This will be discussed in more detail later.

Also, the contract structure is negotiated with the customer in the sales phase of the project. Usually, sales director negotiates the contract with the customer, but sales director needs help from many expertise areas to negotiate an optimal contract for the case company. After contract is signed, the project will move to the project opening phase.

In the project opening phase, currency hedging must be done as soon as possible after contract signing. The case company's policy is to avoid currency risks which makes currency hedging a critical task. Without hedges, losses could be major. In the same time, the project structure should be constructed for internal systems. The project structure is influenced by many things such as contract structure and functionalities of ERP system.

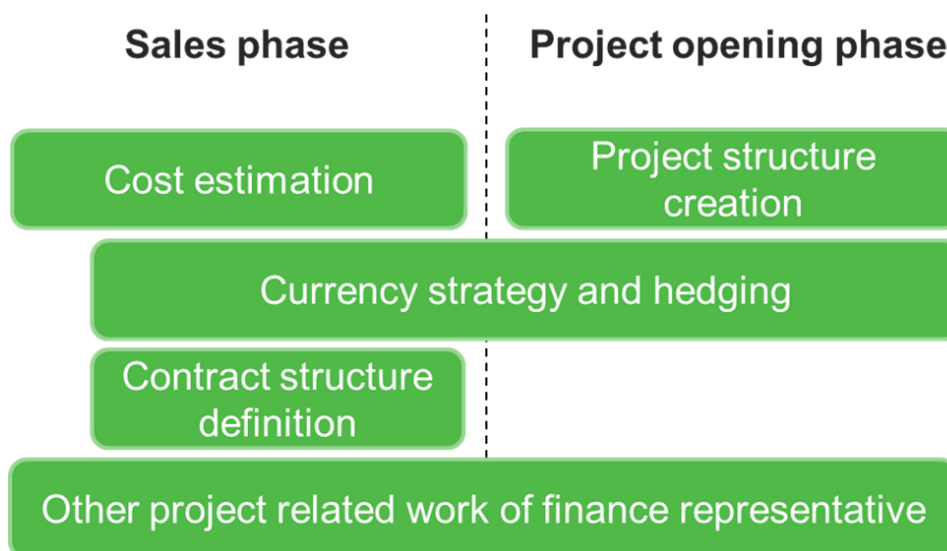


Figure 9. Financial processes in sales and opening phases of mega project

According to Hodgson (2004) complexity arises for example from formless structures, discontinuous work, or turbulent environments. Mega projects have all of these. So, to keep all tasks of financial processes under control, clear structures, roles and responsibilities are needed. This thesis focuses on the roles and responsibilities of participating actors. Especially, the role of mega controller (who is nominated controller of the mega project) is under closer examination as he or she has the view over all financial processes.

7.2 Definitions

Legal companies in the ERP system

The ERP system of the case company includes for example sales orders, purchase orders, logistical transactions, capital project revenues and costs, and finance transactions. The ERP system is divided into legal companies, which have their own data. Every location or legal unit of the case company has its own legal company. Legal companies don't have access to the data of other legal companies which means that visibility to other legal units in the case company is not provided by the ERP system. In the future, the ERP system will be replaced with a new one, but this is not considered in this thesis.

Pass through parts in the ERP system

Because the ERP system doesn't provide transparency between legal companies, it must be carried out some other way. The case company has tackled this issue with pass through parts. Pass through part is made for example in a situation where one legal company makes an internal order to another legal company. In that case, a legal company which makes the internal order will report net sales of the order, but the profit stays in the legal company where the work is done. An example in Figure 10 below clarifies the situation. In the figure, legal company A has a contract with the customer. However, legal company B is producing some part of the project, so legal company A makes an internal order for legal company B. With pass through part, net sales can be reported by legal company A, but profit by legal company B.

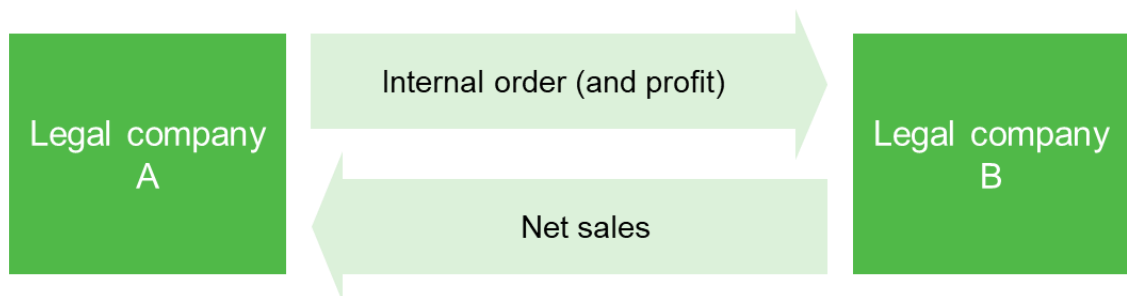


Figure 10. A simplified example of pass through part

However, pass through parts are necessary only in the current ERP system. After the new ERP system is implemented, pass through parts wouldn't be needed anymore, because it will provide global visibility across all legal companies.

PMT (Project Management Tool)

In addition to the ERP system, financials of projects are handled and monitored in the case company's internal system called PMT (Project Management Tool). PMT provides for example possibility to estimate projects' percentages of completion which is not possible in the ERP system. Project in PMT is linked with all legal companies in the ERP system so it provides a comprehensive view to financials of the whole project.

POC (percentage of completion)

Projects of the case company lasts often many years. Thus, net sales and profit are recognized already when projects are still in progress. The case company uses POC (percentage of completion) to estimate and recognize net sales and profit of projects. POC is determined by the following formula:

$$\frac{\text{Actual costs}}{\text{Total estimated costs}} = \text{POC \%}$$

Transfer pricing

Tax authorities in many countries don't allow companies to move money internally from one legal company to another across the borders without taking any fees from the money. Thus, transfer pricing model must be implemented.

Next, a practical example of transfer pricing is introduced. Let's assume that legal company A sells a project of 10 million euros. However, legal company B produces the whole project so the whole 10 million euros belongs to legal company B. Despite that, the whole amount of money cannot be transferred across country borders because of tax regulations. Legal company A must take a fee for itself from it. The amount of fee is calculated with a certain formula. In this case, it is assumed to be 3,5%. The fee is thereby 0,35 million euros which is pure profit for legal company A. The net sales for legal company B from this project is therefore 9,65 million euros.

To apply transfer pricing in practice, transfer pricing project needs to be created to PMT in project structure creation phase. POC percentage of transfer pricing project should then imitate the POC percentage of the corresponding project. This way, transfer pricing is handled quite automatically in project reporting.

Management audit meetings

Management audit meetings are organized in the case company for individual projects to provide a basis for in-depth decision making. Participants of management audits include for example heads of business units, area president, head of business line, treasury, head of global operations, head of sales, head of business line's legal, and business line controller. For mega projects, they are organized in three different forms, each in a different phase of the sales project as illustrated in Figure 11.



Figure 11. Sales process and points of time of management audit meetings

Management audit meetings are organized for projects that exceed the case company's criteria. Basically, all three management audit meetings are organized for all mega projects. Every management audit meeting has a standardized PowerPoint -template which is filled by a sales director. Practically, management audit 2 is the broadest and former management audits handle only part of the things of management audit 2.

Purpose of management audit 0 is to make sure that sales people are aiming at the right outcome regarding scope and risks. Management audit 0 is to be arranged at the latest during the indicative proposal phase.

Management audit 1 is organized before the firm proposal. President of the business line will submit the material to CEO. Management audit 2 is organized before final negotiations. Also, in the case of management audit 2, President of the business line will submit the material to CEO.

7.3 Financial processes of mega projects

The case company doesn't have a very clear process description of financial processes for mega projects. However, the case company has some guidelines for processes of mega projects in its internal systems. This platform of guidelines is called Direction handbook and it includes guidelines for example to managing, selling, and delivering solutions. Some of the processes are described very accurately, but some financial processes are not included at all. Direction handbook doesn't consider for example creation of project structure to the ERP system. Any of the processes handled in this thesis aren't documented very well in the Direction handbook.

The aim of this thesis is to improve project controlling in mega projects especially at the sales and opening phases. Thus, this thesis handles financial processes that are linked with project controlling. To be able to make improvements to the processes they must first be described. Therefore, the current states of selected financial processes are next illustrated.

7.3.1 Cost estimation

Every unit has its own cost estimator who estimates project costs for his or her own unit. Mega projects have nominated MUP cost estimator who collects cost estimates of every unit together and makes the summary of cost estimation for the whole project.

Cost estimation work depends on the phase of the sales process. The phases of the sales process are illustrated in Figure 12. Cost estimation work is done for indicative proposal, budget proposal and firm proposal. In every phase, cost estimation work should be done with minimal effort to still provide the required accuracy.



Figure 12. *Phases of the sales process*

To indicative proposal, cost estimators should be able to give an indicative price for the project without detailed cost estimation. At budget proposal, cost estimation should be more accurate with detailed cost estimation. Finally, at the firm proposal phase, in addition to detailed cost estimation, cost estimations should include for example cash flow curves, currency basket and MUP pricing summary (introduced later). Thus, it requires cooperation with for example procurement and treasury experts.

Procurement department has a critical input to cost estimation as it tries to make a procurement plan already in the sales phase of the project. Especially, the main equipment of the project is tried to ask from suppliers for the procurement plan. Sometimes procurement also makes preliminary agreements with suppliers. Cost accuracy is tried to enhance in cost review meetings where procurement goes through cost uncertainties with cost estimators.

Mega projects in the case company can be divided to multiple delivery entities called *islands*. Usually, every island includes deliveries from many technology units, and they can consist of parts which are delivered by a different business line. These parts of the islands have their own cost estimators. Thus, every part of the island has its own cost estimation. These cost estimations are summarized by cost estimator of the main delivery. MUP cost estimator, in turn, summarizes cost estimations of all islands to MUP pricing summary.

MUP pricing summary is made based on cost estimates of different units involved in the project. MUP cost estimator is responsible for collecting cost estimates of different units and combining them to one document: MUP pricing summary. MUP cost estimator makes pricing summary in cooperation with the sales director. Process of creating MUP pricing summary is illustrated in Figure 13.

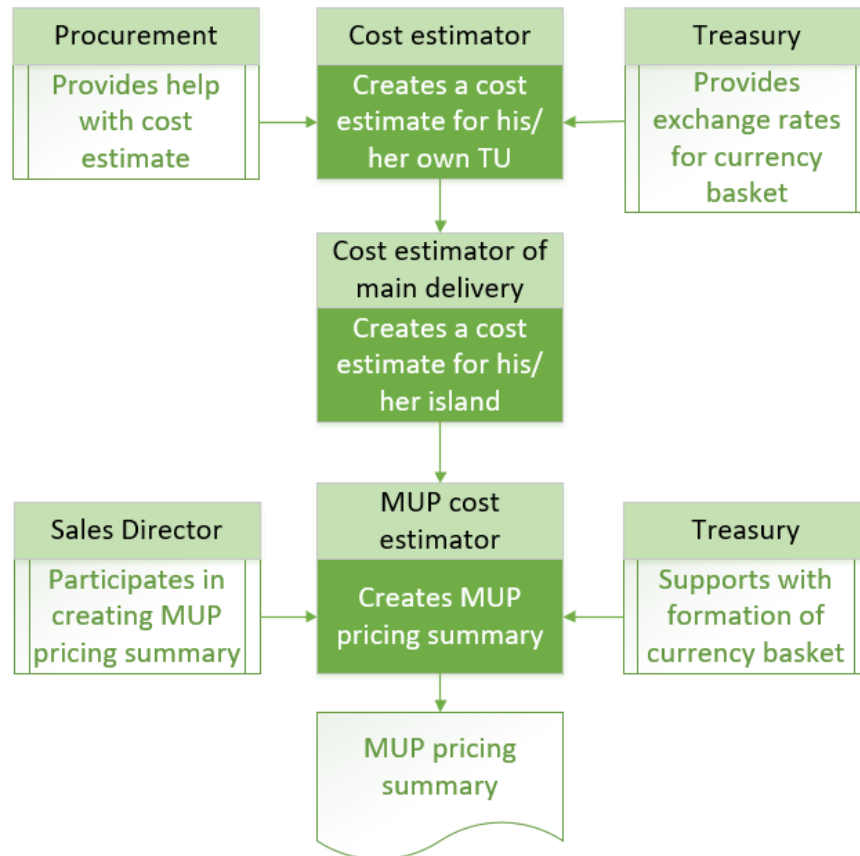


Figure 13. Simplified process of creating MUP pricing summary

MUP pricing summary is an Excel document which includes what will be delivered to the customer. It contains a lot of information about costs and prices, which is why one of the interviewees called it 'Excel monster'. Pricing summary includes a summary sheet where user can easily see costs, contingencies, warranty provisions, project margins and net sales divided for business and technology units. Other sheets of pricing summary have more detailed information about costs. MUP pricing summary is used as a basis for selling price to the customer. It is therefore important that pricing summary is accurate and comprehensive for the use of sales director.

In addition to sales, pricing summary is needed to create the project structure to the case company's internal reporting and monitoring. When the contract is signed, the mega controller should organize currency hedges and create project structure as soon as possible. He or she base project structure on MUP pricing summary. However, according to interviewed mega controllers, MUP pricing summary and cost estimates of technology units don't serve mega controller's needs very well. For example, they don't include information related to pass through parts, transfer pricing or legal companies. Also, division to onshore and offshore parts is unclearly defined in MUP pricing summary.

MUP pricing summary includes also a currency basket. The currency basket is a group of currencies with different weightings. It is used to hedge the project from currency fluctuations. Cost estimator of every unit creates the currency basket based on currencies the project will use. To create the currency basket, cost estimator needs help from treasury experts because they provide exchange rates for the currency basket. Procurement has a critical role in defining currency basket because they determine where the purchases of the project are made from, which in turn, has a direct influence on currencies used in the cost estimate. According to interviewed treasury manager, cost estimators and procurement should actively understand what currency rates are used. He emphasized that old currency rates must not be used. Hence, the latest currency rates should be investigated and used in project pricing.

MUP cost estimator will collect currency baskets of every unit together and make a collective currency basket for the whole project. MUP cost estimator will then discuss with treasury expert about currency basket. If it appears in discussions that currency basket should be modified, new currency baskets should probably be collected from units. This, however, demands quite a lot of work. Interviewed MUP cost estimator was unsure what actions should be taken if the currency basket is assessed to be modified.

7.3.2 Contract structure definition

Contract structure is defined for every project separately. In smaller projects, contract structure may be quite similar, but in mega projects, contract structure varies a lot between projects. A contract is usually constructed on top of some contract template. According to legal director, public companies often want to use the FIDIC contract template whereas private companies prefer their own contract template, the same contract template as in the previous project, or a frame contract template. Usually, buying party wants to maintain competition between delivery providers to the end of the negotiations which means that it cannot use a contract template of one of the delivery providers (such as the case company's). It must use a contract template which doesn't give a competitive advantage to any of delivery providers.

A contract is defined to best serve both customer's and the case company's needs. Usually, taxes are a major factor affecting contract structure. The contract can be built for example so that there are different contracts for onshore and offshore parts. With the contract structure, the case company tries to optimize its tax payments. In addition to tax optimization, the customer often has its own requirements as well. Hence, the contract structure is tried to create so that both customer and the case company are satisfied with it. The current process of defining contract structure is illustrated in Figure 14.

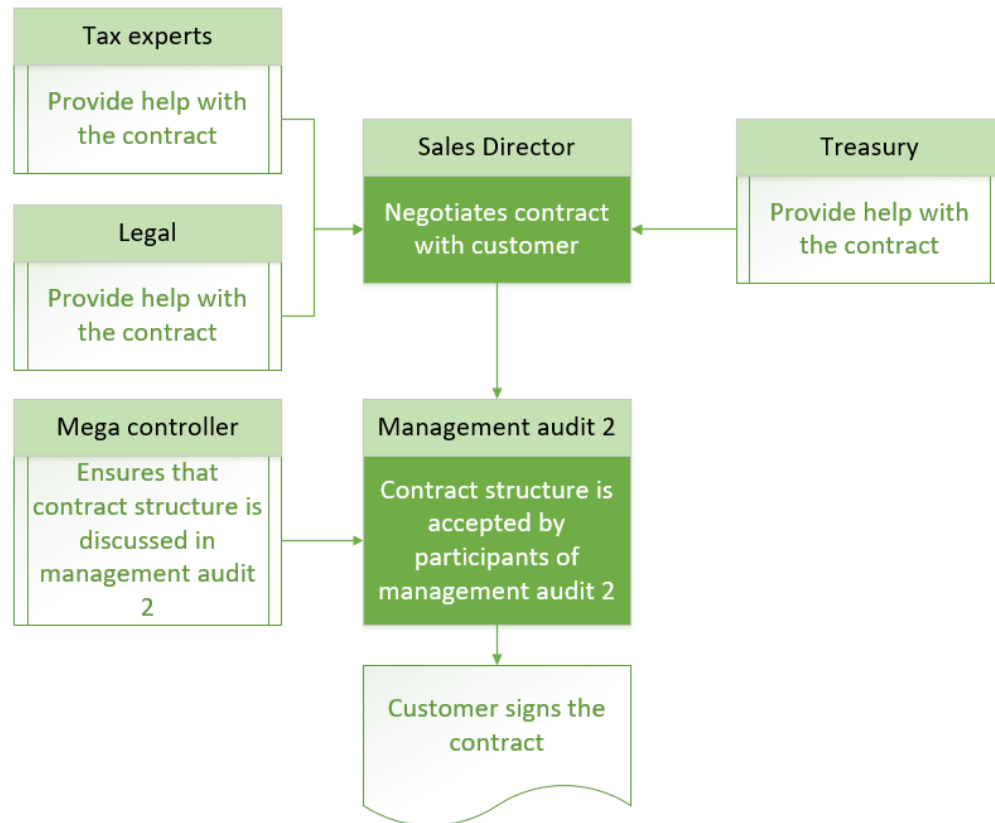


Figure 14. *Simplified process of defining contract structure*

The legal department has a crucial role in defining contract because it ensures that the case company's contract policy is followed. The legal department participates to the sales process after the sales director asks it. This can be for example from management audit 1. Participation can also start when the sales department starts to collect deviations to contract or when discussions start about contract template. If the preliminary contract doesn't meet demands of the case company's contract policy, the legal department's role is to make sure that permissions for deviations are asked from business line president, area president or CEO. In addition, the legal department ensures that special subjects are taken into consideration. It ensures for example that tax issues and financing issues (such as letters of credit and guarantees) are considered by responsible actors.

Sales director said in the interview that discussions about contract structure should be started earlier in one of his projects. If discussions about contract structure had started earlier, it would have clarified certain things in the negotiations and reduced the number of open issues. Interviewed tax director was on the same page. He said that in some projects, sales director may have discussed contract structure with the customer already before he is discussed with the tax department. Tax director thinks that the tax department is often informed too late. If the sales director has already discussed with the customer about one kind of contract, it is then more difficult to negotiate a different contract.

Often tax department wants to for example divide contract to onshore and offshore portions to avoid tax risk and optimize tax payments.

Tax director said that there is not any certain point when tax department participates to a sales project. Some sales directors and legal people understand to include tax issues into discussions earlier than others. It depends on responsible people's nature and experience.

According to the tax director, the tax department's task is to calculate tax calculations and illustrate the consequences of them. However, the tax department doesn't have a comprehensive view of the project. Still, the tax department is often asked to approve the tax risk. Tax director thinks that it shouldn't be tax department who decides about tax risk. He thinks that the final decision of taking tax risk should come from sales and business people who have a broader understanding of the project.

7.3.3 Creating the project structure and opening the project

The project structure is a structure which tells how the project is structured in the case company's internal systems. With a carefully created project structure, the case company ensures that every participating unit is treated fairly and within the limits of the law. The main purpose of the project structure is to divide costs and profits appropriately to different units and functions. Project structure helps to monitor project by project parts. This means that every business line, business unit and technology unit have their own budgets, estimates and costs. These figures are monitored in every unit with the help of the WBS structure. As mentioned earlier, the project structure is made based on the MUP pricing summary and cost estimations of technology units. However, they don't usually provide enough information to easily create the project structure.

Project structure gets more complex if the project is delivered from more than one legal company. Because the ERP system doesn't offer transparency between legal companies, pass through parts must be created. The complexity of the project might increase significantly if the contract structure differs from the usual structure. The contract can, for example, be established with legal company A, even if deliveries are done mainly from legal company B. Depending on contract structure, transfer pricing may be the way to transfer money to the right entities inside the case company. This, in turn, makes one complexity more to project structure. All in all, based on interviews, creating the project structure seems to be difficult and require communication among stakeholders, especially in complex mega projects.

The mega controller is responsible for creating the project structure. This phase requires a lot of understanding about the case company's way of working and different structures that occur in the case company. One of the mega controllers said in the interview that creating of project structure took three weeks altogether. She said that calculations of MUP pricing summary didn't serve her needs. One of the sales directors was very surprised by that. According to him, the MUP pricing summary template is similar for every mega project and it provides direct costs, contingencies, warranties, and profits separately for every technology. According to interviews with mega controllers, MUP pricing summary doesn't include information such as division to legal companies, pass through parts or information about transfer pricing. This information mega controller must gather from somewhere else. Process of creating the project structure is illustrated in Figure 15.

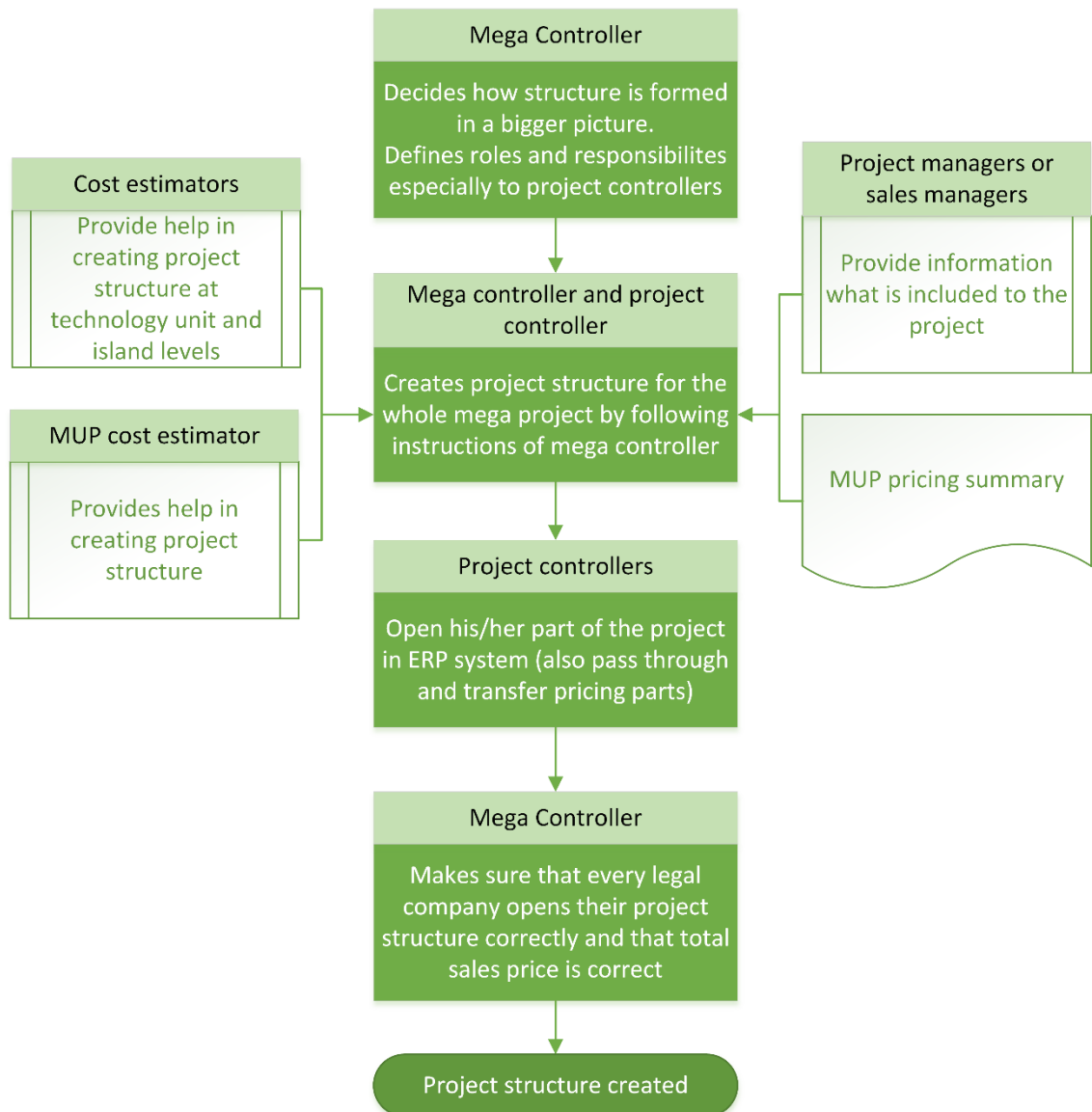


Figure 15. Simplified process of creating the project structure of mega project

Creating of project structure hasn't been as straightforward as it could be. As mentioned, one mega project took three weeks before it was opened to the ERP system. Many stakeholders need the project to the ERP system as soon as possible. Without project structure in the ERP system, allocation of purchases, employee's work hours etc. cannot be put to the ERP system. Also, many stakeholders want to see the project structure in the ERP system to understand how the project is divided between units. Thus, it is important that the project structure is ready as quickly as possible after contract signing. However, the project structure is not the only thing that can restrict the project's opening to the ERP system. Often the project cannot be added to orders received before down payment is received. Hence, it cannot be added to the ERP system either before down payment.

Creation of project structure usually starts when the contract is signed. It could be prepared earlier, but the contract structure can change until the signing, which could affect to project structure as well. There is also always a possibility that the case company never signs the contract.

It is difficult to illustrate the project structure creation process because it is not documented, and the case company doesn't have a clear process to it. Especially responsibilities of mega controller and project controllers are unclear. Interviewed project controller said that he didn't get very clear tasks to do in the process. He hoped that the mega controller would give more exact instructions so that the responsibilities of every stakeholder were clear.

However, the process starts by meeting of mega controller and project controllers. Agenda of this meeting is to plan the next steps in project structure creation. Basically, the mega controller tells how the structure is defined in a broad level and project controllers define the structure of their part of the project in more detail. Controllers need to first enquire from project or sales managers what is included to the project because the scope might have been still changed just before contract signing. Cost estimators have already divided cost estimates based on units, but cost estimations usually lack something relevant. Thus, controllers need to investigate missing issues. According to a mega controller and a project controller, they need to find out where certain purchases are planned to make from, how onshore and offshore portions are divided and how pass through parts are constructed.

When the plan of the project structure is ready in Excel, it can be opened in the ERP system. Project controllers are responsible for this opening in practice. However, the mega controller must ensure that every unit of the project reports orders received at the same time.

The creation of the project structure was the biggest challenge for one of the interviewed mega controllers. The main challenges were caused because of the following reasons:

- MUP pricing summary didn't provide enough information for project structure
- Contract structure was exceptional
- Roles and responsibilities in creating project structure weren't clear to all participants
- The project was the first mega project for the mega controller

7.3.4 Currency hedging

Purchases of mega projects are made on a global basis which causes the involvement of different currencies. The case company is trying to avoid risks, so currency hedging is quite a critical process in mega projects. Also, contracts of mega projects can be made in different currencies. Hence, the sales price must be hedged as well. Obviously, to avoid currency fluctuation, sales price and purchases should be hedged at the same time. Otherwise, the profit margin of the project could change with the currency fluctuation.

At the sales phase of the project, currency hedging issues are investigated by sales director. Sales director contacts to treasury people, mainly to senior manager of the treasury, who is responsible for currency hedging issues. According to treasury manager, sales director doesn't always consider currency hedging early enough. Treasury manager thinks that knowledge of sales directors about currency hedging should be increased. He said that now, all sales directors are not aware of their responsibilities in currency hedging and they don't understand the consequences of currency rate fluctuations. As said in chapter 7.3.1, the currency basket is made by cost estimator who asks currency rates from the treasury. However, the sales director is responsible for creating currency hedging plan.

When the project is complex, project managers often have an illusion of control (Langer 1975). A project manager may believe his or her abilities so much that he or she underestimates risks and overestimates positive information (Durand 2003, Simon et al. 2000). This may be noticeable also for sales directors of the case company. Even though sales directors should know their responsibilities regarding currency hedging, they don't always follow the process. For example, currency hedging plan isn't always introduced in management audit 2. This may arise from their poor understanding of currency hedging issues. Treasury manager's suggestion is to increase sales directors' knowledge about currency hedging issues might thus prevent these problems.

When the contract becomes effective (after the contract is signed or advance payment received), currency hedges will be done as soon as possible. Usually, every purchase can be hedged individually, but sometimes procurement decides to make purchases as a lump sum. In that case, also currency hedges must be done as a lump sum. Naturally, every currency has its own lump sum to hedge.

Trade finance controller is a person who makes currency hedges in practice. She hedges purchases based on currency baskets which she gets from the mega controller. Interviewed trade finance controller told about a problem in currency hedging of the latest

mega project: Right after she had done currency hedges in SEKs (based on cost estimation), she got an information that the purchases were made in EURs which means that some other trade finance controller was probably hedged the same purchases in EURs. Because of this, an unnecessary hedge will be effective still 18 months and causes bookings all this time.

Interviewed trade finance controller said that she doesn't often know who is responsible for certain purchases in new mega projects. She must ask it from supply and category management director who often doesn't know the answer as well. This leads trade finance controller to go through purchases of every project every month. She often finds out that purchases are made, but they are not informed to her. In these situations, purchasers use daily currency rate in the purchase order. If the trade finance controller manages to find out this kind of purchase order, it can be corrected until the first receiving is made. In practice, trade finance controller tells purchaser to change the order. However, usually, this is not the case in mega projects as currency hedges are usually made right after the project is effective (even if purchases are not yet made). Therefore, if purchases from China are decided to be bought from Europe, a forward contract must be closed with countertrade and accept the bookings of the future, which can be either positive or negative.

To make currency hedges for mega project's purchases, trade finance controller needs to know the schedule of purchases. She will get it from procurement people. However, if purchases are made as a lump sum, trade finance controller must make currency hedges without a purchase schedule. She usually split the lump sum to for example three parts and make currency hedges to those parts.

According to interviewed supply and category management director, purchasers should be aware of the influences of currency hedging. However, he said that a few new purchasers have joined the team. The last training session with finance function was held approximately two years ago, but the issue has been discussed also in department meetings. According to supply and category management director, knowledge about the effects of currency hedging may not be at the same level in all locations and all purchasers don't necessarily have the same understanding about the issue.

When treasury manager was asked about improvement themes in currency hedging, he mentioned a few more things that are not yet discussed here. He thinks that it should be clarified what information should be gone through in management audit 2. Also, the process should be improved so that big mistakes can be prevented. Treasury manager thinks that drafting process charts is not enough. He thinks that more important is to

consider how to implement the drafted process in practice so that processes work even if people in the organization change.

Treasury manager also raised one example project that could have been handled in a better way. This example project had an onshore portion which was sold in EURs. The onshore portion was in Chile. Offers from subcontractor were asked in EURs and cost estimates were made based on these offers. However, the subcontractor wanted to sell its services in CLPs and the case company agreed to that. Therefore, the case company needed to make big local currency hedges which could have been prevented if offers were asked in CLPs in the beginning. Treasury manager wanted to illustrate with the previous example the importance of hedging plan. He said that supply chain, procurement, pricing and mega controller should all decide together from where purchases are made and in which currencies.

7.3.5 General problems

Interviews of tax director and legal director revealed problems which have an influence on many financial processes. According to legal director, Direction handbook is too heavy to follow. He said that the facts are difficult to find. In addition, the role of the legal department is not found from there. The legal director suggested that Direction handbook could be streamlined.

The legal director also said that tools of business processes are separate from each other. For example, the information doesn't remain in the system from management audits or deviations to the contract. The information is saved only to notes and emails. According to legal director, relevant information should be found from somewhere. For example, he would like to see who is approved certain things and when they are approved. However, the legal director thinks that support functions and risk management are taken well along to the process. The problem is that different functions and people should "run on the same rhythm". The legal director thinks that now special experts and functions (e.g. tax, legal, treasury) have too much responsibility for participating to the process. Therefore, sales director must take care that special experts participate enough. According to legal director, it would be good to have one person who would take care of these issues continuously. Also, tax director thinks that one person should be coordinating the process. According to him, this would bring transparency between different actors. The legal director said that the process is not transparent at the moment. There is not any system, which would show what tasks are done by whom and when. Even if the situation is told in management audits, they don't reveal how the process has progressed.

According to the mega controller, sales people know how the sales process should progress, but they don't always follow the process. This causes many problems because they don't always take every stakeholder into discussions early enough. As mentioned earlier, for example currency hedging plan and contract are sometimes discussed too late. Also, management audit slides sometimes lack some relevant information about currency hedging and contract structure.

7.4 Examination of processes in former mega projects from mega controllers' point of view

In this section, four mega projects are discussed especially relating to projects' sales and opening phases. In this thesis, these four projects are called MEGA1, MEGA2, MEGA3 and MEGA4. All four projects had appointed mega controller. Mega controllers in MEGA1 and MEGA2 were both business controllers and worked with mega projects in addition to their business unit responsibilities. The mega controller in MEGA3 and MEGA4 was also working beside her other job which was the business controller of a business line. MEGA1 was the first project where the concept of the mega controller was used. However, in earlier projects, there has been a controller who has taken responsibility of overall control of mega project, but the controller hasn't been nominated to that role officially before MEGA1. In some of earlier mega projects, project controllers have taken responsibility of overall controlling.

MEGA1 was a very complex project and it consisted of 26 parts in the case company's ERP system. The mega controller had to create these 26 parts to the ERP system. To create all these parts, she had to gather a lot of information from different sources. She went through contracts, she learned how different calculations work, she had to know which technology units are involved and which deliveries are included, and she had to know how figures will be calculated to profit and loss account. However, project opening for MEGA1 went well and there weren't any major problems.

MEGA1 seemed to proceed as planned. The case company got a signed contract and advance payment from the customer. Then, suddenly the customer wanted to suspend the project. The customer wanted to open the project again for competition and to invite other companies to tender for the project. However, eventually, the project was started by the case company. The project proceeded for six months when the customer again wanted to suspend the project because of force majeure. The project was suspended without predetermined suspension time. Because of suspension, the mega controller had a new peak in her workload. She had to make many kinds of reports and other

clarifications of the situation. The project director was very active in the situation and made the most of the work. Mega controller's role in this situation was to help project director with reports and other issues. However, the mega controller had to coordinate finance organization because every unit had to close their recognitions of the project. The project was scattered around the world, but the mega controller had to make sure that every location acts similarly. Eventually, the customer decided to continue with the case company and the project was continued normally.

MEGA2 was only a pre-engineering project but it required the same steps in the sales and opening phases than delivery projects. The project had more parts than any other project, so it was relatively broad. It didn't include onshore parts though. Mega controller thinks that creating the project structure wasn't too difficult. He got needed help from MUP cost estimator. However, it wasn't very clear how for example contingencies or transfer prices were defined. The mega controller said that ready-made template would help to create a project structure.

MEGA3 is much newer than MEGA1 or MEGA2. Hence, people remember this project very well. There were many unclarities of responsibilities and tasks in MEGA3, especially from mega controller's point of view. First, the contract structure wasn't handled in the case company as early as it should have been handled. People needed to hurry with contract structure at the end of the sales. The customer wanted different contract than the case company, so the case company's tax department planned as good contract structure as possible. However, this contract structure wasn't included in slides in management audit 2 which meant that less attention was given to contract structure than other things. Some interviewed people think that the contract structure could have been better if it was handled more carefully. Also, management audit 2 didn't include currency hedging strategy which is also in the template of management audit 2. In MEGA3, it was unclear, whose responsibility was to make sure that these kinds of things were handled in management audit 2. The main responsibility would have belonged to the sales director, but he experienced the management audit template unnecessarily wide, so he cut some of the things out. Many interviewees said that mega controller should ensure that certain things are handled in management audit 2, but in this case, she was unsure about her responsibilities.

MEGA3's extraordinary contract structure caused a few difficulties in creating the project structure. Mega controller thinks that MUP cost estimation didn't help her a lot with project structure. MUP cost estimator of this project was located outside Europe and used different MUP cost estimation template than MUP cost estimators in Europe. According to the mega controller, this was the reason why all relevant information wasn't available

for her. She said that it should be developed to serve better also her needs. According to interviews, the mega controller's lack of experience might have had an influence on difficulties as well. Process of creating project structure wasn't very clear for project controllers and interviewed project controller said that he involved to structuring the whole mega project even though his responsibility should be only in his own technology unit. However, MEGA3 has started well and these problems haven't had a major influence on the project after all.

MEGA4 was signed during the research process. The project was sold outside Europe. It revealed many challenges in financial processes. The main thing which arose in the interviews were challenges in communication. Especially, communication from the local office to the global organization was lacking. According to the business controller, they tried to ask information from local people, but local people didn't answer their questions. Trade and export finance director said that there were multiple mistakes in the contract, e.g. in bank guarantees. In addition, currency hedging process didn't go as planned which caused losses for the case company. One of the interviewed sales directors said that challenges in the sales of MEGA4 arose because sales director of MEGA4 reported that the case company won't probably get the contract. Thus, stakeholders thought that the project wasn't so critical. According to the mega controller, stakeholders weren't ready to make currency hedges when the contract was signed. The finance department didn't get information from sales and cost estimators about what is sold and from where. Mega controller thinks that this was because sales people didn't follow the processes. Sales people don't know influences and risks of everything, so they are not able to take certain issues seriously. The business controller said that local people, who signed the contract, didn't talk to trade finance & cash management expert, who would have had the best knowledge about certain issues that should have been taken into consideration before signing the contract.

7.5 Stakeholders' expectations and wishes for a mega controller

Project Controllers (3 persons interviewed)

The main message of one of the project controllers was that he would need more exact instructions and guidelines for working with mega project. He also hoped that roles and responsibilities would be clear so that every participant would know what issues are on their responsibility. Interviewed project controller said that he participated very intensively in structuring the project to ERP systems after contract signing. It wasn't a problem

for him, as he liked it. However, he said that it shouldn't be his task to think the whole project structure. Project controller thought that he had to participate more intensively because mega controller of the project was not so experienced. The project was the first for the mega controller. According to the project controller, an optimal process would work so that the project controller would be responsible only for his or her own technology units.

Interviewed project controller said that he didn't know the role of mega controller very well. It was very unclear to him. The mega controller has been quite invisible towards the project controller. Though, she had become more visible lately. Still, the project controller rarely notices doings of the mega controller in his daily work. Role of the mega controller hasn't planned through structures. Conversely, it is developed from top to bottom. Project controller hopes that mega controller would participate in the project in a more concrete way.

In practice, the project controller hopes that he would get clear instructions and structures from the mega controller. Clarity of cooperation with different stakeholders should be improved as well. In an optimal situation, the mega controller would direct the discussion so that the project controller would be able to just put readymade plans into practice. Project controller thinks that one person (mega controller) should coordinate the whole project opening process. He or she should coordinate for example when and how the project is opened, when and how to start making orders, who will make orders and which orders, etc. It should be clear for the mega controller to know what questions should be asked and from whom. Also, it should be clear who are participating to project opening.

One of the project controllers said that it is important that mega controller makes sure that all parts are correctly in the ERP system, PMT and other systems. She also said that the most important thing is that mega controller and project controller speaks with each other and share their knowledge. According to her, responsibilities of mega controller could be split so that also project controllers could take responsibility for mega projects. The project controller was responsible for one earlier mega project and she enjoyed it. She would like to have similar challenges again.

Project Director

According to the project director, the role of the mega controller is new, so it has not yet become stable and clear. Project director thinks that it is mega controller's responsibility to ensure that the case company is going to the same direction in different units. The mega controller also makes sure that currency hedging etc. are handled in a harmonized way through project organization. The project director said that in his latest mega project,

the mega controller has a big role in internal processes because of the project's exceptional contract structure. Project director describes the role of mega controller necessary. Depending on the setup of the project, it can be bigger or smaller. Generally, the mega controller should help project director with finance matters because project people don't have enough financial expertise. According to the project director, the amount of cooperation with the mega controller is at a suitable level. He doesn't think that mega controller is trying to participate too much but he thinks he gets help from her if needed. If the project director hopes more activity from the mega controller, he will tell it to her.

Project director thinks that one important role of the mega controller is to connect the project's parts with each other with the help of business controllers and project controllers and summarize the project. The mega controller should steer project estimation from a financial perspective. According to the project director, the mega controller should think what is best for the case company, while business and project controllers think what is best for their units.

The project director hopes that the mega controller could control more in the project's delivery phase. The mega controller could also participate in risk assessment. One task of the mega controller is to familiarize herself better with the project's cost estimate. Project director mentioned that mega controller should know if the project has hidden reserves somewhere in the project. Even if hidden reserves would be a positive thing, it hampers estimation of the project. Generally, the mega controller should sharpen the project's cost estimate. In practice, cost estimation belongs to business units, but the mega controller is a person who should delegate this need down to business units and technology units.

Sales Directors (2 persons interviewed)

In the interview of the first sales director, his opinion was that one mega controller can't handle every mega sales project. He thought that the current role of the mega controller is passive, and that mega controller should take a more active role for example in management audit -meetings. The mega controller should make sure that management audit template is filled accurately enough. Sales director thought that mega controller and sales director should cooperate so that mega controller would more actively help him.

The second interviewed sales director said that mega controller seems to be distant from active sales. According to him, the role of the mega controller is not clear regarding active sales. At first, the sales director said that he doesn't know what kind of role mega controller could have in supporting active sales. He thought that maybe the sales director hasn't had the knowledge to take advantage of the mega controller. As said, the sales

director was very unsure about the mega controller's role. He thought that maybe the mega controller is a person who think tax issues and who makes sure that everything is understood. According to him, the mega controller's responsibility is also to divide the project to for example onshore and offshore parts. Sales director thinks that mega controller is not participating actively in the project's sales phase, but she participates to it when the sales phase is almost over.

The second sales director said that currently, it is his responsibility to discuss with tax experts and treasury about contract issues and currency hedging. He suggested that mega controller could take a role in discussing with tax experts and treasury. This is how mega controller could provide more expertise to sales which would give sales director an opportunity to focus more on his or her core task with sales. The sales director said that contract issues and currency hedging might be left background when the focus is on the sales. However, they are important matters, so the sales director suggested that mega controller could be the person, who ensures that also this kind of issues are managed at the right time.

To conclude, both interviewed sales directors said that mega controller should have a more active role in mega project's sales phase.

MUP cost estimator (2 persons interviewed)

One of MUP cost estimators didn't really have any expectations or wishes for the mega controller. He didn't know very well what mega controller do. According to MUP cost estimator, he doesn't work a lot with the mega controller. When the mega controller is making a project structure, he or she cooperates with units' cost estimators as they provide cost estimates for every unit. Thus, MUP cost estimator doesn't get any input from the mega controller. MUP cost estimator didn't know what mega controller do when project structure must be created. He guessed that mega controller maybe collects different unit's cost estimates together.

The other MUP cost estimator had a better understanding about the role of mega controller. He thinks that mega controlling works well in a current way. However, also he wasn't very sure about information mega controller would need from cost estimators.

Controller, Trade finance

Trade finance controller thinks that it is important to have one controller who knows the big picture of the whole mega project because she doesn't have access to figures of other legal companies. Mega controller, on the contrary, has information about other legal companies as well. According to trade finance controller, the mega controller should know what currency hedges are done for example from Finland and Sweden to prevent

overlapping currency hedges. Trade finance controller said that mega controller should give currency basket of the project to her as soon as possible right after contract signing. She said that time shouldn't be wasted with currency hedges.

Trade finance controller hoped that mega controller would tell her if he or she hears something which affects to trade finance controller's work. Trade finance controller should know who is doing and what (regarding currency hedging). According to her, the flow of information is the hardest thing in the firm.

Trade finance controller was very pleased with the cooperation with the mega controller. However, the mega controller sits next to the trade finance controller which makes co-operation easier. Trade finance controller doubted that communication with mega controller would be much harder if he or she sat for example in Sweden's office. According to her, a description of roles and responsibilities is therefore very important. Grey areas shouldn't be left. She said that money will be lost if information isn't flowing properly. Trade finance controller has worked also with another mega controller, who didn't sit next to her (but in the same building, anyway). Cooperation with other mega controller was also good and trade finance controller thinks that the amount of cooperation has on both cases been on a convenient level.

Director, Project Management Office (PMO Director)

PMO director seemed to be a very development-oriented person. According to him, the role of a project controller has been understood wrong in the case company. He said that the project controller (also mega controller) should be profiled more to project engineer than finance person. This means that in addition to the financial aspect, project controller should prepare project schedule and update it, make a risk assessment, create a budget, master cost- and schedule dimensions, look after claims, etc. In other words, the project controller should be fully involved in the project. PMO director thinks that his suggestion for mega controller requires that the mega controller's contribution would be fully in mega projects.

However, PMO director was asked also about mega controller's current role which is finance oriented. He said that the mega controller should participate more in estimating the project. Generally, the mega controller should have a more active role. The mega controller should learn to know project managers, who he or she is working with.

PMO director doubted the role of project controller. He asked "How can you be a project controller if you don't know the risk analyses? How do you take care that this double-dipping, that some risk already exists somewhere, and it will be taken to estimate so that

there wouldn't be any double bookings?" "How do you know if your schedule contains some part which has gone over?"

To conclude, the PMO director thinks that mega controller is required to understand the project comprehensively. According to him, the current role of mega controller works but is reporting oriented. Thus, the role should be more proactive to enable predictability and transparency.

Business Controller

Only one of the interviewed business controllers hasn't had the role of mega controller. According to her, it is important that also business controllers get the information from meetings in the sales phase of mega projects. She said that it is important to have the mega controller in management audit meetings. The mega controller should ask right questions regarding currency basket and contract structure. He or she should also make sure that trade finance is involved in the sales phase.

Business controller thinks that directly after the contract is received, the mega controller should call a meeting for business controllers, project controllers, and trade finance expert. The meeting shouldn't be organized locally, but it should involve people more widely. Otherwise, there would be emails back and forth. According to the business controller, this kind of meeting is lacking today. Participants of the meeting would get information about many things like warranty dates and when to open the project. Also, the responsibilities of participants should be clarified in the meeting.

Business controller thinks that in the delivery phase, the mega controller should look at the total view of the project every month and go through every island. By this, the mega controller would get an understanding of how the project is going.

Tax director and legal director

Tax director and legal director had very similar thoughts about the role of mega controller. Now, neither of them works straight with mega controller and either of them never mentioned the term 'mega controller' in the interview. However, both hoped that there would be one person who works with mega projects continuously. Tax director said that in an optimal situation, there would be one person who is coordinating the whole sales process. This kind of person would provide transparency between different functions.

Treasury

Treasury thinks that every mega project should have nominated mega controller. The mega controller should have experience from financing cases and knowledge about currency risks. Treasury thinks that sales people are handling so many things that they

cannot go deeply into all the issues. Therefore, the mega controller should have the best understanding of currency risks of the project, and he or she should urge sales people to handle currency issues properly. The mega controller should also ensure that different scenarios are considered in case of changes in negotiations. Ready considered scenarios would enable fast reactions to currency hedging plan. However, treasury knows that the sales director has the final responsibility to make sure that currency risk is thoroughly considered.

Trade and export finance director

Trade and export finance director didn't know very well the responsibilities of the mega controller. She hoped that mega controller would look after the overall project from the viewpoint of the case company. Trade and export finance director think that someone should give information such as domestic content clearance. However, she wasn't sure if mega controller should be the one who provides this information. Anyway, she thinks that domestic content clearance should come from one source. Currently, information for that needs to be asked from many people. In earlier cases, one of the cost estimators has provided that information.

Trade and export finance director didn't have very specific expectations for the mega controller, but she hoped that there would be one contact point for questions about the project's financial issues. She also said that there should be one person who has control over the whole project. Trade and export finance director thinks that mega controller should be nominated already at the bidding phase and he or she should continue until the end of the project.

Trade finance & cash management expert

Interviewed trade finance & cash management expert has a wide experience of e.g. identifying currency risk. He knows well mega controller's role in his own expertise area. He said that mega controller's role is to delegate control so that risks are handled. According to him, the mega controller does sometimes work his or herself, even if there would be someone who would have a better understanding of the issue. Trade finance & cash management expert illustrated this with an example. In one project, the mega controller dealt with currency risk issues with treasury director. Trade finance & cash management expert thinks that mega controller could have delegated currency hedging issues to him because he has probably wider knowledge about handling currency hedging issues. Trade finance & cash management expert said that he has noticed also other situations when mega controller could have delegated tasks to other experts. However,

trade finance & cash management expert thinks that mega controller could participate in the process. He or she shouldn't just do the work by him or herself.

Summary of stakeholder's expectations and wishes for a mega controller

The role of the mega controller was quite unclear to many interviewees as can be seen from Table 3 below. Stakeholders wish that mega controller handles the whole project and participates actively to different kinds of activities. The mega controller is expected to more actively take part in the sales phase of the project. He or she was hoped to familiarize him or herself to tax and currency hedging issues to be able to support the sales director with them. Knowledge of tax issues would enable the mega controller to take a more active role at defining contract structure. The mega controller is expected to be on track about currency hedging in different legal companies.

Table 3. *Summary of interviewees' opinions to the role of mega controller*

Interviewee	Clarity of the role of mega controller	Main improvement themes for the role of mega controller
Project Controller	Unclear. The mega controller is quite invisible towards the project controller.	Need for more exact instructions and guidelines. Clarity of cooperation is important. More concrete participation to project.
Project Director	Unclear. The role is new, so it is not stable yet.	More controlling in project delivery phase. Cost estimation could be sharpened. The mega controller could participate in risk assessment.
Sales Director 1	-	More active role at the sales phase (for example in management audit meetings). Supporting the sales director at the sales phase.
Sales Director 2	Very unclear at active sales.	More active role at the sales phase. The mega controller could participate more actively to tax and treasury matters.
MUP cost estimator 1	Very unclear. Role at creating project structure is very unclear.	The role of the mega controller was very unclear.
MUP cost estimator 2	Clear	-

Controller, Trade finance	Clear. Trade finance controller sits next to the mega controller which may affect the clarity of the role	-
Business controller	Clear	Clearer role of mega controller and other stakeholders. More communication towards business controllers.
PMO Director	Clear but should be changed.	The role of the mega controller should be changed totally. The mega controller should be responsible for project schedule, risk assessment, budget etc. The role should be more engineering oriented.
Treasury	Clear	The mega controller should ensure that currency baskets and hedging plans are ready in management audit 2.
Legal	Legal department doesn't work with mega controller	A comprehensive coordinating role for sales processes to one person (could be mega controller).
Tax Director	Tax team doesn't work with the mega controller before contract signing.	A comprehensive coordinating role for sales processes to one person (could be mega controller).
Trade and export finance director	Unclear	The mega controller should ensure that domestic content clearance information is considered.
Trade finance & cash management expert	Clear from his point of view	The mega controller could delegate his or her work more to experts.

Right after the project is sold, the mega controller should coordinate its opening to ERP systems. The mega controller is expected to inform project controllers what are their responsibilities and what they need to do. At the project delivery phase, the mega controller is expected to give general financial support for project people when needed.

7.6 Summary of challenges found during the research

Based on research results above, many challenges can be perceived in financial processes. The found challenges are listed below.

Challenges in cost estimation

1. MUP pricing summary and other cost estimations don't provide needed information for currency hedging and project structure creation
2. Cost estimators are not aware of the needs of project controllers and mega controllers
3. Cost estimations don't provide currency information for procurement which makes currency hedging more difficult

Challenges in contract structure creation

1. Contract structure is not always considered early enough before contract negotiations. Legal and tax people are often informed too late
2. Processes don't tell clearly an exact point when for example tax people should participate
3. The tax department is often asked to give acceptance for tax risk even though it doesn't have a comprehensive understanding of the project
4. Contract structure is not always introduced in management audit 2

Challenges in creating the project structure

1. All participants don't have clear roles and responsibilities
2. Exceptional contract structure causes problems in the creation of project structure

Challenges in currency hedging

1. Currency hedging plan is not considered early enough before contract negotiations
2. Relevant stakeholders don't understand the importance of currency hedging
3. Sales people don't always follow the process which causes problems in currency hedging
4. Currency hedging plan isn't always introduced in management audit 2

5. Procurement and trade finance controller don't communicate enough which causes trade finance controller to make wrong or unnecessary hedges
6. Trade finance controller doesn't often know who is responsible for certain purchase and thus must often ask about it

Challenges in the role of mega controller

1. Role of the mega controller is unclear to many important stakeholders
2. Sales directors, tax director and legal director experienced that nobody has a big picture of tax, currency and legal issues in sales projects
3. The mega controller doesn't have time to participate actively in currency, tax, and contract issues in the sales phase of the project
4. A suitable amount of resources for mega controlling are difficult to define because the quantity of mega projects differs

Other challenges in financial processes

1. Direction handbook is difficult to navigate and follow
2. Processes are not transparent towards tax, legal and treasury departments
3. Processes for sales are described, but sales people don't always follow them

Because there are so many problems found in financial processes, they must be prioritized. As illustrated in chapter 2 in Figure 1, influencing possibilities to project costs are the biggest in the sales phase. Hence, problems in the sales process are often the most critical. Based on this research, the most critical part of financial processes is defining the contract. After the contract is signed, the case company is tied to it and it cannot be changed anymore. A lot of effort should, therefore, be put to ensure that the contract is as good as possible for the case company. Figure 16 illustrates the biggest problems that occur in defining the best possible contract in the case company.

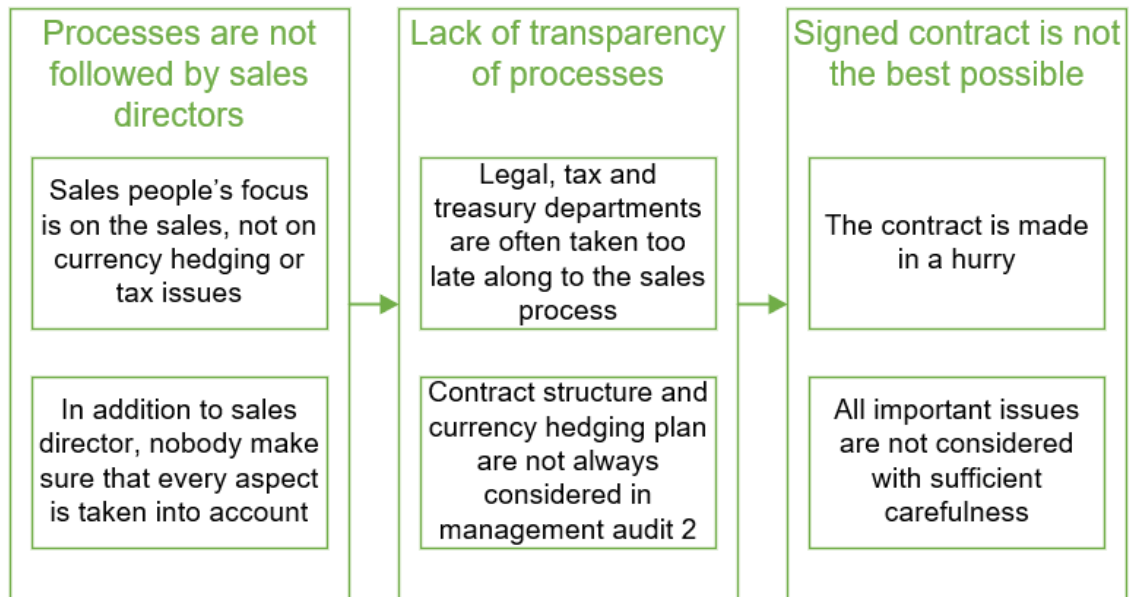


Figure 16. *The biggest reasons why the contract is not necessarily as good for the case company as it could be*

Another process, which has caused problems in the case company, is the creation of project structure. Based on interviews, the problems originate from cost estimations. Especially, cost estimation templates are not designed for the use of the controller. Instead, they are designed for example to provide cost information needed in decision making in the sales phase. However, cost estimates could rather easily include needed information also for creating project structure and making currency hedges. Problems in cost estimation are thus linked to many other problems. In other words, by improving cost estimates, many other problems would be solved. These linkages from cost estimation are illustrated in Figure 17.

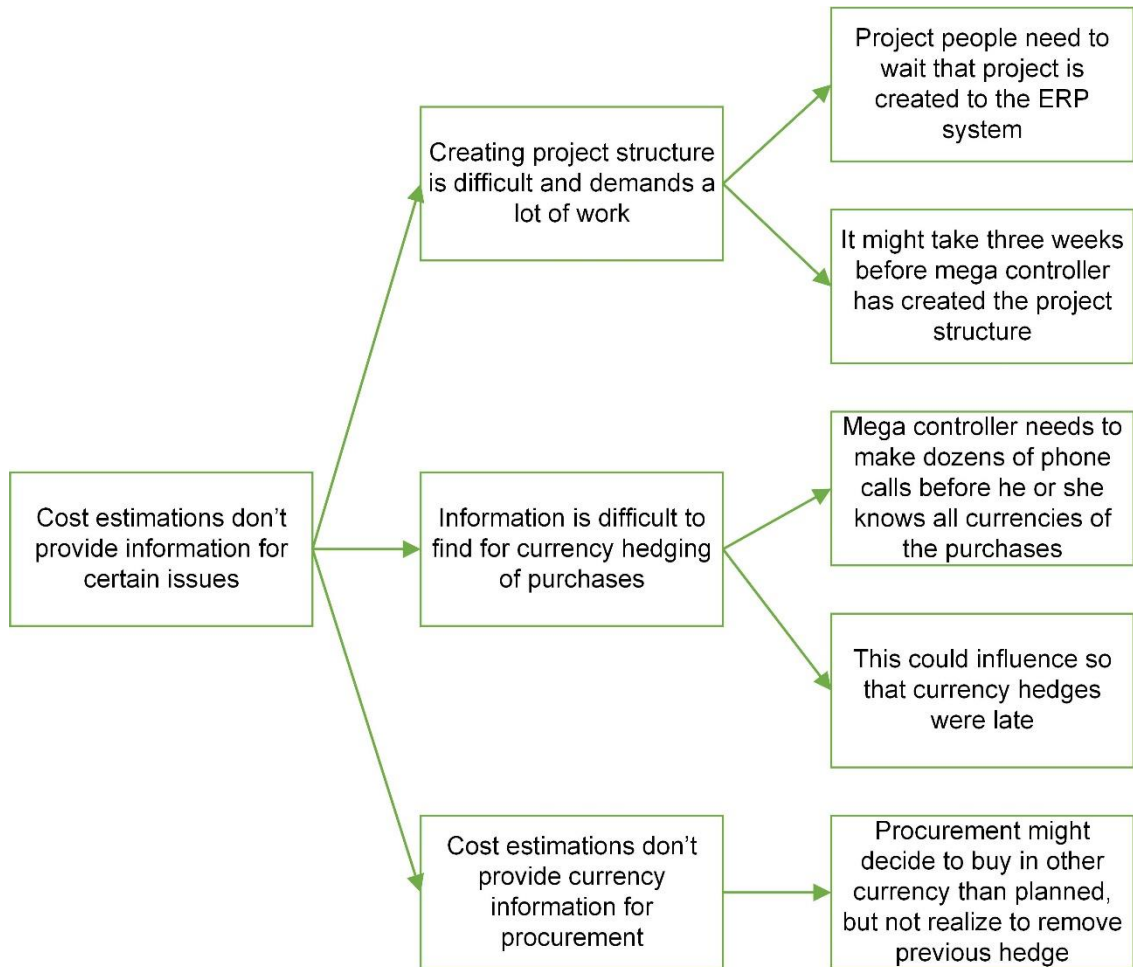


Figure 17. *Problems that arise from lack of information in cost estimations*

However, the lack of needed information in cost estimations is not the only reason for the problems. For example, the project structure creation process has a problem which arises from unclear roles and responsibilities in the creation process.

Many the found problems relate to communication inside the organization. An example of cost estimator, who doesn't even know what information controllers need, reveals the lack of communication in the organization. Similarly, communication from sales director towards tax, legal, and treasury departments is not always very structured which is why it is difficult for these experts to participate properly.

7.7 Improvement suggestions for financial processes

Many problems were found in financial processes. Because problems are now written down, it is time to consider if they can be prevented or how their negative effects can be reduced. Before proposing any improvement suggestions, criteria for the solutions is good to be made. The aim of solutions is to improve processes in a way that enhance

the case company's possibility to eventually make more profit. In other words, lean thinking can be applied. According to Hines et al. (2004) value can be created by two ways in processes. Firstly, internal waste can be reduced which reduces associated costs. Secondly, the value can be increased by offering additional features or services which are valued by the customer. (Hines et al. 2004) In financial processes, the customer of processes isn't usually the end customer, but it can be, for example, sales director. Based on problems, improvement suggestions can be made, and they are introduced in the next chapters.

7.7.1 Cost estimation

This thesis doesn't handle cost estimation process as such. Instead, this thesis considers the outputs of cost estimation especially from the viewpoint of the finance department. During the research, it has been found that problems occur in the currency hedging process and when cost estimates are moved to the ERP system. Currently, cost estimation templates don't very efficiently serve the needs of creating project structure to the ERP system. Surprisingly, MUP cost estimator didn't even know the role of mega controller in creating project structure. Thus, to serve the needs of the mega controller, MUP cost estimator should have a clear understanding of his or her needs. To clarify the needs for cost estimation templates, MUP cost estimator and mega controller should plan together an improved cost estimation template and MUP pricing summary. This way MUP cost estimator would get knowledge of requirements of the mega controller and, in turn, the mega controller would get a more comprehensive understanding about cost estimation work. Improvement of cost estimation templates and MUP pricing summary could also make currency hedging easier. As mentioned earlier, the mega controller needs information about costs divided by legal companies and divided also to onshore or offshore portions.

The need to improve cost estimations was recognized in the organization already during the research process. The researcher attended a meeting where mega controller discussed with MUP cost estimator about MUP pricing summary and cost estimations in general. The meeting was very beneficial because MUP cost estimator got an understanding about the needs of the mega controller and other finance people. Finally, MUP cost estimator showed currency basket template, which could provide the needed information for currency hedging. Even though that kind of template was already made, it wasn't in use because MUP cost estimator hadn't understood that mega controller would need it. MUP cost estimator and mega controller agreed to test the template in the next mega project.

The above is a very illustrative example of the importance of communication. Thus, one improvement suggestion is that mega controller and MUP cost estimator should communicate more to clarify each other's needs and processes of cost estimation. In practice, the mega controller should discuss with MUP cost estimator right away when he or she recognizes problems in cost estimations. Conversely, MUP cost estimator should ask what mega controller wants from cost estimation if he or she isn't certain about it.

Procurement has a big influence on the accuracy of cost estimation in mega projects. Often, at cost estimation phase, purchases are not yet certain. There is a relatively high possibility that some of the purchases are bought from somewhere else that is illustrated in cost estimates because of for example cheaper price. Purchases can, therefore, be cheaper or more expensive than in the cost estimation. Most importantly, purchases can be made in a different currency than in cost estimate which affects to currency hedging. It is therefore important that procurement people check currencies of cost estimates before currency hedges are made.

If procurement decides to make a certain purchase from somewhere else than is planned in the cost estimate, it doesn't often inform trade finance about that. The reason behind this is that procurement doesn't often see from cost estimate the currency that is originally planned for certain purchase because the cost estimate is made only in one currency. If the cost estimate is made for example in euros, procurement doesn't know which purchases are planned to make in a different currency. When procurement then decides to make a certain purchase from Finland instead of China, it doesn't realize that it should inform trade finance to update currency hedges, and currency hedges for CNY will be still effective. Additional currency hedges can naturally cause losses for the firm. Instead, if procurement decides to make the purchase in for example SEK currency, it naturally takes agreed currency rate to the ERP system.

This problem would be solved if cost estimation was transparent so that procurement would be able to see where certain purchases are planned to make from. This kind of tool could be implemented to cost estimation Excel spread sheet. According to supply and category management director, the best option would be to implement this kind of tool in the ERP system, but even transparency in cost estimation would help a lot. In practice, MUP cost estimator, a person from procurement, trade finance controller, and optionally also mega controller should find a solution together to enhance the transparency of cost estimation. They should gather together to share their thoughts about this issue.

Summary of main improvement suggestions for cost estimation:

- Improvement of cost estimation templates and MUP pricing summary to provide relevant information clearly → Currency basket template will be used in the future projects
- More communication between the mega controller or project controller and cost estimators to clarify each other's needs
- Transparency of cost estimation's purchase currencies should be enhanced in cooperation between MUP cost estimator, a procurement person, trade finance controller, and optionally mega controller

7.7.2 Contract structure definition

Sales director of mega project negotiates contract structure with the customer. In previous projects, the sales director hasn't discussed contract structure with the mega controller. In addition, the mega controller is only a little or not at all in contact with the tax department or legal department. Hence, the mega controller hasn't participated a lot in mega projects' sales phase. However, sales directors, tax director and legal director hope that mega controller would participate more actively to the sales phase of the project. The contract is one of the issues that the mega controller could help with. The latest mega controller, in turn, hoped more information from sales of the project. She suggested that the sales director could, for example, send preliminary contract draft to the mega controller so that mega controller could check if the contract includes critical issues. Tax director suggested that mega controller could coordinate the whole process in a way that would increase transparency between functions and actors.

One of the sales directors also suggested that mega controller could act as a link between the sales director and experts of tax and legal issues. It would have its pros and cons. Benefits from this would be mega controller's deeper participation into the sales phase and deepening of his or her understanding of contract and tax matters in the project. On the contrary, this would add one more link to the process which could reduce the efficiency of the process. A question occurs: does it add value enough to be beneficial in the bigger picture?

This research has shown that sales people don't always follow the processes. Based on previous mega projects, they need more support with currency, tax and contract issues. There is a too big probability that they forget something during the sales phase of complex mega projects. Hence, there should be somebody who supports them and makes sure that every aspect of the sales phase has been considered at the right time. The

mega controller would be a very suitable person to take this kind of responsibility. However, the nominated mega controller is now working beside her other job as a business controller and she doesn't have time to participate more than she currently does. Thus, the current resources of the mega controller are not enough. More about mega controller's resources are discussed in the discussion section.

In practice, the mega controller would be needed in the sales phase to several different things. First, he or she should ensure that tax experts are consulted before sales director talks anything about the contract to the customer. Tax experts would then be able to provide tax calculations and make suggestions to the contract. Second, the mega controller should ensure that currency hedging plan is made in time. Until now, sales director has had a responsibility to prepare the currency hedging plan before management audit 2. However, they are often so focused on the sales that they don't always put a lot of effort into currency issues. Currency hedging plan is an important part of defining contract because decision makers don't always have knowledge about currency risks and need consulting of the treasury. Third, the mega controller should consult also legal department before discussions about contract template are started.

All in all, similarly as Burström et al. (2013) found in their study, also this study shows that the role of project controller or mega controller is to act between different functions and his or her role is more or less informal. Thus, the mega controller is a boundary subject, who lightens boundaries between actors and brings them closer to each other and improve holistic and integrative understanding of participants' viewpoints (Laine et al. 2016a). In practice, the mega controller can provide transparency about sales, currency, tax, and legal issues by communicating these to relevant stakeholders. The transparency would enhance understanding about issues that are relevant in the contract, which in turn, probably help to prevent big mistakes in the contract.

Tax director said that the sales department often discusses contract structure with the customer already before discussing with tax department first. He suggested that kick-off could be organized regarding contract structure already before sales people promise anything to the customer. Kick-off could be organized in a light way for example through email. Anyway, the purpose of kick-off would be to make sure that every participant is able to comment on contract structure and give their opinions. This would prevent situations where certain aspects are left out of the discussion.

According to former mega controllers, one of the responsibilities of the mega controller is to make sure that the sales director introduces contract structure as a part of management audit 2 slides. However, this wasn't clear to the mega controller of the MEGA3.

Hence, the contract structure wasn't included in the slides of management audit 2. Therefore, responsibilities and roles must be clarified regarding the contract structure.

When one of the sales directors were interviewed the second time, he told that meeting called 'global mobility review' will be taken into use. According to him, there is an intention to include also contract structure issues to this same review. The review would be organized to every mega project in the firm proposal phase after management audit 1. In this review, the contract structure needs to be considered for global mobility issues. Simultaneously, the contract structure could be considered also more generally. This meeting would force sales director to consider contract structure already before management audit 2, which would enable tax and legal experts to comment contract and give their opinions. The review would remove the need to kick-off meeting that tax director suggested. However, the name of the review is not very descriptive because it doesn't indicate anything about contract structure issues. Thus, the name should be changed to e.g. "Contract and global mobility review".

Tax director said that they are often asked to give approval for tax risk even though they don't have a comprehensive understanding of the project. One of the interviewed sales directors said that this can be the case and that he didn't immediately realize it. However, sales director understood later that the tax department doesn't have so comprehensive understanding of the whole project. Thus, sales director should be responsible to communicate the influences of tax risk to business line and finance experts who could decide if tax risk is worth taking.

Summary of main improvement suggestions for contract structure definition:

- Greater participation of mega controller in the sales phase to make sure that everything is considered
- Organizing contract and global mobility review in firm proposal phase after management audit 1
- Making sure that the contract structure is discussed in management audit 2
- Sales director should be responsible for communicating tax risk to business line and finance experts

7.7.3 Project structure creation

Creation of project structure took three weeks in the latest mega project. However, it seems to be quite a straightforward process. This indicates that processes can be improved significantly. Based on interviews, creating the project structure of complex mega

projects hasn't been very smooth. In the latest mega project, it was difficult for the mega controller to find out which deliveries are delivered from where. This information is urgent because it is needed for currency hedging. The mega controller could have delegated that work to project controllers, but she thought that she would save time if she does it herself. Based on the findings of this study, a clear description of responsibilities might have made the creation process smoother.

Project controller has a relatively wide role in the process of creating project structure. Therefore, his or her opinions about the process should be taken seriously into consideration. Interviewed project controller hoped that mega controller would give exact guidelines and instructions for him in order to ensure that he knows what to do and when. According to him, the predictability of processes in mega projects would increase efficiency. Project controller said that in the ideal world, the mega controller would steer the processes and discussions so that the project controller could just implement the plans in practice. Thus, the mega controller could be the person, who coordinates the whole project opening phase. According to the project controller, the mega controller should, for example, coordinate when the project will be opened, how it is opened, how to start making orders for the project, who is making certain orders etc. To conclude, the project controller would want a clear process description which tells what should be considered in creating project structure and how these actions will be carried out.

Based on experiences of the last mega project, the mega controller should delegate tasks more clearly to other stakeholders such as project controller. Project controller of project island's main delivery could be responsible for creating the project structure for the whole island. Mega controller's responsibility could be to steer and coordinate project controllers' work. The mega controller is responsible to create rough project structure, but project controller's task is to find out details of the project structure. This way mega controller can focus on bigger picture and project controllers are involved deeper in the project. Interviewed project controller suggested that mega controller would give all project controllers a question list to which they need to gather answers. This would clarify the responsibilities of project controllers. When project controllers have gone through the question list, a collective meeting could be kept with project controllers and mega controller to ensure that everything is clear to every participant and project structure is created properly.

Other problems in project structure creation have arisen from a lack of information in cost estimations. Improvement suggestions to cost estimations, introduced in chapter 7.7.2, would facilitate the creation of project structure significantly.

Because the project structure creation process isn't yet described, a suggestion for it is next introduced.

Project controller's role in creating the project structure

As said earlier, mega projects are usually divided into islands. One of the project controllers of the island's technology units could be responsible for creating the project structure for the whole project island. Responsible project controller would be a project controller of the main technology unit of the island if mega controller didn't nominate someone else to it. This responsible project controller would have a lot of responsibilities in the financial processes of mega projects. His or her role in mega project would become active when the contract is signed. Project controller wouldn't thus participate in the sales phase of the project. Project controllers of smaller technology units would have the same responsibilities as in regular projects. Therefore, this description of responsibilities is only for the project controller who is responsible for creating the project structure for one project island.

Project controller should hurry after contract signing because currency hedging needs to be done as soon as possible. In practice, the project controller would need to find out currency baskets for every legal company separately. So far, this information hasn't been provided by cost estimations. If cost estimations don't provide this information, the project controller would need to find it out. Project managers and sales managers should be able to tell which deliveries are delivered from which legal company, and cost estimators and procurement should be able to tell wherefrom purchases are planned to make.

To create the project structure, project controller should discuss with the project manager or sales manager to ensure what the project includes. They have the latest information about for example the technologies that are included in the project. The mega controller will decide the principles of the project structure. Therefore, the mega controller can determine to include for example individual part for collective purchases which don't have profit at all. This kind of part is an example of a part which is used only for monitoring collective purchases. An island might also have a part which includes coordination expenses of mega project. Similarly, these kinds of parts are determined by the mega controller. Project controller would be responsible for creating project parts for different technology units including onshore and offshore parts, pass through parts, and division to different legal companies. He would also create transfer pricing parts based on mega controller's instructions. After the project controller has created the project structure of project island to for example Excel, mega controller combines all islands and create project structure to the whole mega project.

When the mega controller is ready with the project structure of the whole mega project, project controller can open the project to ERP systems and other financial systems (such as PMT). Project controller must coordinate practical project opening process and support, for example, local entities because some legal companies are not very familiar with the ERP system and its functions. Therefore, it is sometimes necessary that the project controller travels to the local site and provides hands-on help.

Summary of main improvement suggestions for project structure creation:

- Clear responsibility for project controller to create the project structure for his/her island
- Clear question list for project controllers at the beginning of creating the process to clarify project controllers' responsibilities
- Improvements in cost estimations

7.7.4 Currency hedging processes

According to interviews, currency hedging processes could be improved in many ways. Interviews of the treasury, sales director and mega controller revealed that currency hedging plan isn't considered early enough before contract negotiations or it is never made at all. This may be caused by the sales director's lack of understanding regarding the influences of currency hedging. Therefore, the mega controller could take more responsibility for supporting currency hedging issues in the sales phase of the project. However, sales director should still have the main responsibility of currency hedging strategy because responsibilities are difficult to divide. Even if the sales director has the main responsibility, the mega controller should more actively work with the sales director to ensure that probability of problems in currency hedging plan would decrease. The mega controller should have a good understanding about the influences of currency hedging to provide value-added to the process.

Because relevant stakeholders such as sales directors, sales managers, business controllers, project controllers, procurement and cost estimators don't always understand the importance of currency hedging, it is important to have a person who is on track of currency issues of the project. Clearly, the mega controller is a suitable person to support currency hedging issues because he or she has a broad understanding of the project and its financial issues. The mega controller should thus be able to ensure that the sales director follows the process and that currency hedging is considered early enough. In addition to mega controller's more active participation in currency hedging issues, trainings for relevant stakeholders could be organized to improve their knowledge about the

influences of currency fluctuations. Even upper management could participate in currency hedging training to ensure that they realize to demand currency hedging plan in management audit 2.

In previous projects, currency hedging plan has been on the sales director's responsibility. However, treasury director suggested that it could be considered together with the sales director, supply chain, procurement, cost estimator and mega controller to ensure that every aspect is considered. This suggestion indicates that treasury director hasn't been totally satisfied with previous currency hedging plans. Therefore, this suggestion could be taken to use. Currency hedging plan could be considered together with mentioned stakeholders in a specific meeting. Because sales directors haven't always followed the processes, it would be better if the meeting would be organized for every mega project.

In practice, a meeting called 'currency hedging plan meeting' could be organized before management audit 2. This meeting could take e.g. 30 minutes. Participants of this meeting should include sales director, procurement, MUP cost estimator and mega controller as treasury director suggested. Sales director could prepare preliminary currency hedging plan to this meeting so that participants would be able to comment it. As a result of the meeting, currency hedging plan should be ready to be introduced in management audit 2.

Because cost estimations are not ready right after the contract is signed, information for currency hedging must be gathered from somewhere else. However, as mentioned in chapter 7.7.1, currency basket template is already made for this purpose. This currency basket template would provide a division of currencies based on legal companies and onshore/offshore portions. If cost estimators would fill this template quickly after the contract is signed, the mega controller wouldn't need to search the information by phone and email.

One of the improvement themes already introduced in chapter 7.7.1 and it relates to the visibility of purchases in cost estimation. In addition, trade finance controller doesn't often know who is responsible for certain purchase and thus must often ask about it. Supply and category management director suggested that it would be good to highlight this issue in the project's kick off meeting. He said that by highlighting purchases in a different currency, transparency would be enhanced. He supposed that it wouldn't harm anything.

Also, based on interviews of trade finance controller and supply and category management director, it seems that procurement and trade finance controller don't communicate enough with each other. Because of this, trade finance controller can make wrong or

unnecessary hedges. Therefore, trainings could be organized for purchasers about currency hedging so that they would understand the influences of currency fluctuations. According to the trade finance controller, purchasers who understand the importance of currency hedging, contact more often and inform trade finance controller more frequently about currency issues.

Summary of main improvement suggestions for currency hedging:

- Highlighting purchases that will be made in different currencies in project's kick off meeting
- The mega controller should more actively participate in creating currency hedging plan
- Currency hedging plan -meeting for every mega project to be organized before management audit 2
- Transparency of cost estimation's purchase currencies should be enhanced in cooperation between MUP cost estimator, a procurement person, trade finance controller, and optionally mega controller
- Currency basket template into use
- Trainings for relevant stakeholders (sales directors and managers, business controllers, project controllers, procurement, cost estimators, and upper management) about currency hedging

7.7.5 Other improvement suggestions

The legal director mentioned that Direction handbook is difficult to follow. The influences of this should be investigated. The difficulty of Direction handbook may be one factor why sales directors don't always follow the processes. Hence, Direction handbook could be updated to a more user-friendly platform where it would be easier to use and follow.

Now, processes are not transparent towards tax, legal and treasury departments. These departments participate in sales projects only if they are asked to because they don't have the visibility of how the sales project is progressing. As legal director suggested, a system could be created to provide transparency in the sales project. Every involving stakeholder would see every event of the project from the system. In practice, the system would provide information if someone has approved something and it would also tell if sales director has already discussed with the customer about contract etc. This kind of system could be implemented to one of existing platforms in the case company. For example, Compass, which is a tool for sales, could be used for this purpose.

However, implementing a system to some of the existing platforms would take time. At first, relevant stakeholders should gather together and share their needs and opinions. Relevant stakeholders would include people from tax, legal and treasury departments as well as sales director and mega controller. They could together think about how transparency would be achieved without too heavy systems and efforts.

Summary of other improvement suggestions:

- Updating Direction handbook so that it would be more user-friendly
- Creating a system which would provide transparency to every relevant stakeholder

Now, many improvement suggestions for the problems are introduced. However, to implement these suggestions in practice, they need to be clearly prioritized. This prioritizing will be done in the summary chapter.

8. DISCUSSION

Challenges in following the processes

The main challenge found in this study is the fact that processes are not always followed. This kind of behaviour wasn't found in the literature of large projects. Thus, this study can give a relevant contribution to the existing literature. Based on the literature, one of the main success factors is a balance between flexibility and control in performing tasks (Koppenjan et al. 2011, Perminova et al. 2008). This study confirms this. Even though sales people of the case company are aware of their responsibilities, they don't always work as they are expected. Sales people are given flexibility to handle contract structure and currency hedging plan issues in a way they want. The only requirement is to introduce plans for these issues in management audit 2 meeting. Sales people aren't monitored regarding these, but they are trusted to handle needed matters so that everything would be clear before signing the contract. However, sales people don't always take care of these issues, which indicates that they have too much flexibility in their work. This result is not in line with previous literature because the literature has highlighted that one reason for performance problems in mega projects is inability to provide flexible response in unusual situation (Loch et al., Miller and Hobbs, Miller and Lessard, Morris, Winch, cited in Sanderson 2012).

As a result of this study, this challenge can be solved with a few alternative actions. First, sales people could be trained to understand the importance of the process. It might get sales people to focus more on the financial aspects of the project, but it still wouldn't make sure that the process is followed. Second, the mega controller could take a more active role and ensure that sales people follow the process as planned. However, this alternative would need the mega controller to use more time to the project, which means that additional resources might be needed. Third, sales people could be forced to consider certain matters in the early phase of the sales project. This way, they would be forced to follow the processes. Only second and third alternative would increase control of sales people's work.

In practice, the third alternative would be possible with boundary objects. As suggested in chapter 7.7, the case company could launch new meetings where contract structure and currency hedging plan are discussed already before management audit 2. Sales people would be forced to prepare documents (boundary objects) which would provide

needed information for different stakeholders, such as tax, legal, and treasury departments. According to Laine et al. (2016a), these kinds of boundary objects would help to reveal uncertainties and ambiguities and highlight central business impacts.

Cooperation between different functions

Laine et al. (2016a) say that boundary objects and boundary subjects help different actors to get a shared understanding with each other. (Laine et al. 2016a) As results of this study show, shared understanding isn't easy to get. Therefore, boundary subjects and boundary objects have a particularly important role in mega projects of the case company. The mega controller is a boundary subject between many functions. In the sales phase, the mega controller tries to communicate the needs of different functions to each other. He or she acts in between functions and provides knowledge of the big picture of the project. As this study shows, in addition to the finance department, the mega controller works with e.g. sales, tax, legal, treasury, and procurement departments. Based on interviews, stakeholders think that it is necessary to have a mega controller who works at the boundaries. However, interviews revealed that the current concept of mega controller is not enough. Some interviewees hoped that mega controller would take a more active role in every phase of the project. In other words, they hope that mega controller would take more role as a boundary subject. Then again, some interviewees thought that processes should be improved to prevent problems in projects.

Lack of communication

The literature of mega projects focuses a lot on challenges in communication (Loch et al., Miller and Hobbs, Miller and Lessard, Morris, Winch, cited in Sanderson 2012). Also, this study shows challenges in communication. Major challenges found in the study are caused because of poor internal communication. Lack of communication creates unclearities to roles and responsibilities in the project. If roles are not clear to stakeholders, coordination becomes more complex (Bechky 2006). Lack of communication is noticeable in the project opening phase where project controllers don't get clear instructions to do their tasks and MUP cost estimator don't even know what information he or she should provide. Another example of this is a lack of communication towards tax, legal, and treasury people in the sales phase of the project.

Based on the literature, communication can be enhanced by improving project culture (Van Marrewijk et al. 2008). Koppenjan et al. (2011) introduced two types of project cultures. To control complex mega projects, project management could move from predict-and-control approach towards the prepare-and-commit approach. The latter approach highlights the importance of open information sharing between actors. It is more suitable

when uncertainty and complexity are constant, and they are shared with many actors (Koppenjan et al. 2011). Hence, the prepare-and-commit approach would be a more suitable approach in mega projects in the case company. Thus, the case company could benefit from more open information sharing between project participants. However, in matrix organization such as the case company, information sharing between functions is difficult. According to Buvik and Rolfsen (2015), trust between project participants is an important factor of cooperation. Trust helps to create e.g. common work practices, open communication, and clear role expectations. (Buvik and Rolfsen 2015) However, people handling mega projects in the case company change all the time, which makes trust building difficult. Thus, the project needs to be handled well even if project members don't know each other very well beforehand.

According to Nachbagauer and Schirl-Boeck (2019), the importance of communication increases when the complexity of the project increases. They say that projects need clear structures for communication. They also say that communication should be intense, fast and effective to avoid too much information and confused communication. (Nachbagauer and Schirl-Boeck 2019) This study suggests implementing a system which would provide a platform to communicate events of the project to every relevant stakeholder. Thus, the system would increase the transparency of the project and it would be one step towards more open information sharing as Koppenjan's et al. (2011) study suggests.

Mega projects have usually many decision makers in the process. Thus, Saukkonen's et al. (2018) actor-based approach would be suitable in decision making of mega projects. Actor-based approach supposes that decision makers can have different intentions towards the decision. According to Saukkonen et al., communication prevents different participants to conflict with their viewpoints and preferences as everyone would be on track with others' preferences. Communication also makes people to communicate their know-how to other participants which facilitates decision making. (Saukkonen et al. 2018) In the case company, it should be ensured that relevant aspects such as currency hedging plan and contract structure are discussed in management audit 2 meeting. Without communicating these things across the project team, decision makers wouldn't have enough information to make decisions about the mega project. According to Laine et al. (2016a), accounting information can improve interaction in the organization and make it more efficient. Similarly, the information in management audit meetings improves interaction.

Role of mega controller

Majority of interviewees didn't know very clearly what the role of mega controller in mega projects is. The reason for this lies probably behind the fact that the case company had nominated mega controller only to three mega projects before interviews. Thus, the role of the mega controller was not very familiar yet. However, as mentioned before, coordination becomes more complex if roles are not clear to stakeholders (Bechky 2006).

Controllers may have a lot of responsibility for control in an organization (Goretzki and Messner 2018). The mega controller in the case company is a controller of mega projects. The role has thus similar characteristics as project controllers. Burstöm et al. (2013) have found that project controller has an important role in boundaries between functions. They also say that the informal role of project controllers may be surprisingly significant. As mentioned in chapter 4.2, project controllers' informal roles can be divided into five different activities: peacekeeping, probing, nailing, process implementation and streamlining. An organization doesn't demand these roles officially and they are not planned beforehand. Instead, they arise from social interaction, personal skills, and contextual aspects. However, informal roles can be crucial in facilitating communication and coordination of work. (Burström et al. 2013) Based on interviews, stakeholders in the case company hope that the role and responsibilities of the mega controller would be clarified. This means that also informal roles and responsibilities should be documented to provide clarity to the role. This would mean that part of informal roles would become formal roles. Burström's et al. (2013) study didn't consider changing informal roles to formal roles. However, it is obvious that mega controller will always have informal roles that arise from personal aspects.

What kind of roles and responsibilities can mega controller take? According to Järvenpää (2007), the controller can give more value-added for management's decision making and control if he or she is business-oriented. This would mean that the controller would adopt a business partner role. (Järvenpää 2007) Many interviewees in the case company hoped that mega controller would take a more active role in the sales phase. The mega controller was hoped to provide a better understanding of the big picture of the project. In practice, the mega controller was hoped to understand e.g. currency, tax, and contract issues. Based on interviews, he or she should be able to tell how different contract structures influence financial processes and he or she should also have the ability to coordinate currency hedging and project opening efficiently directly after the contract is signed. In practice, the mega controller would need to take business partner role for sales director and he or she should participate in an early phase to the project to ensure that every relevant aspect is considered in the sales phase. However, the role of a business partner

is not easy to adopt (Goretzki and Messner 2018). Managers may want to keep the work in their own hands (Ezzamel and Burns, Lambert and Sponem, Morales and Lambert, Vaivio, see Goretzki and Messner 2018) or they can also think that mega controller could be used as a “project assistant” to help their work.

As mentioned, interviewees hope that mega controller takes a more active role in the sales phase. However, currently, the case company has only one nominated mega controller who works also as a business controller of a business line. Obviously, her workload is already so high that she cannot participate more actively in the projects. Thus, changes in the organization need to be done if the mega controller would be required to take more role in the sales phase. The alternatives to add resources to mega controlling are illustrated in Table 4.

Table 4. *Alternatives to increase resources of mega controller*

Alternative		
1. Giving mega controlling responsibilities to project controllers or business controllers	Pros:	<ul style="list-style-type: none"> + Project controller can have more challenges and variety to his or her job + Project controller probably have already a good knowledge about the responsibilities of mega controller + There wouldn't be need to hire more resources
	Cons:	<ul style="list-style-type: none"> - The workload of the project controller might rise too high especially at the sales phase - All project controllers are not ready to take more responsibility for mega projects
2. Changing the role of a mega controller to a full-time job	Pros:	<ul style="list-style-type: none"> + There would be one person who would have an excellent understanding of controlling of mega projects + One person would be able to handle all mega projects (depending on the number of mega projects)
	Cons:	<ul style="list-style-type: none"> - More resources would be needed - Tacit knowledge wouldn't be shared because only one person would be responsible for mega controlling - The role of mega controller wouldn't necessarily feel very meaningful - The quantity of mega projects varies a lot over the time so mega controller's workload would be changeable
3. Creating a role of sales controller to handle controlling tasks of the sales phase of mega projects	Pros:	<ul style="list-style-type: none"> + The sales phase of mega project would get more emphasis regarding financial processes + One expert would have good knowledge about the sales phase of a mega project

	Cons:	<ul style="list-style-type: none"> - Sales directors might use sales controller as their assistant - There wouldn't be a continuum from the sales phase to the delivery phase - The workload would depend on the current quantity of sales projects
4. Continuing similarly as before	Pros:	+ No changes needed
	Cons:	<ul style="list-style-type: none"> - The mega controller doesn't have enough time to control mega projects with sufficient care - Tacit knowledge wouldn't be shared because only one person would be responsible for mega controlling

The resources of the mega controller are not easy to define. As can be seen from Table 4 above, every alternative has its negative sides. Results of this study show that something needs to be done to increase the resources of mega controlling. One interviewed project controller said in the interview that mega controlling responsibilities would bring new challenges and learning opportunities for the project controller. Thus, the first alternative might increase project controllers' satisfaction in their job. It is also the only alternative which wouldn't require hiring new people. In the long run, the case company would benefit if there would be multiple persons who would be able to control mega projects. However, project controllers have already their own responsibilities with their technology unit so mega controlling responsibilities could rise their workload too much, especially in the sales phase of the mega project.

The case company would probably get the biggest benefit from the second alternative at this point of time. However, the quantity of mega projects in the case company is greatly changeable which of course has a direct effect on the workload of mega controller. Thus, a mega controller as a full-time job is not possible at more silent times.

The third alternative can be left out of consideration because mega controller will get a very deep understanding about the project in the sales phase and there is no point to appoint someone else to the delivery phase who doesn't know anything about the project.

As a conclusion, the best way to increase resources and competencies of the mega controller is to give mega controlling responsibilities to project controllers and business controllers. Primarily, responsibilities could be given to project controllers because they

already have some knowledge about mega controlling. Business controllers usually have competence to help with project controllers' workload in project controlling tasks if needed.

9. CONCLUSIONS

9.1 The results meeting the objectives and research questions

At the beginning of the research project, objectives were set together with the instructor of the research from the case company. Objectives were following. Firstly, *to clarify and improve the processes of mega project controlling especially in the sales and opening phases of the project*. Secondly, *to define and clarify the roles and responsibilities of actors participating in financial processes*. Finally, *to create a concrete process description for controlling mega projects*. Research questions were constructed based on these objectives. The research questions were:

- 1. What are the main factors that cause challenges in the financial processes of mega projects especially in the sales and project's opening phases?**
- 2. How to improve project controlling in mega projects especially in the sales and project's opening phases?**

In other words, the research aimed to identify challenges in the financial processes of mega projects and then to find solutions to improve these processes. The challenges related to lack of communication and to the fact that employees weren't aware of expectations from other stakeholders. The most important challenge found in the research was the fact that processes are not always followed by sales people. To alleviate this challenge, two meetings are suggested to be added to the sales process. Meetings and their relation to the sales process are illustrated in Figure 18.

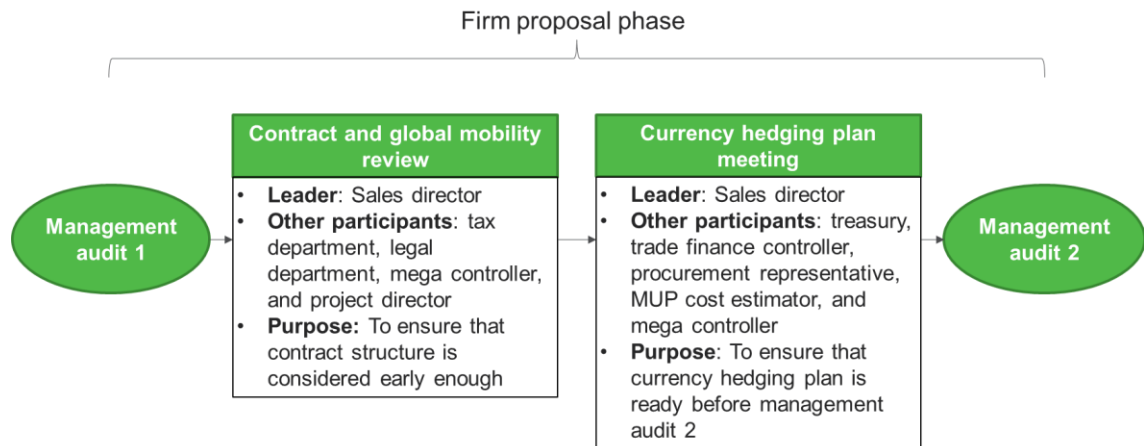


Figure 18. Suggested meetings to the sales process of the case company

The second important challenge was a lack of relevant information in cost estimations. The third important challenge arose from unclarity of roles and responsibilities in the project's opening phase.

To tackle these and other challenges found in research, a roadmap (Figure 19) is made for the case company. The roadmap illustrates challenges and improvement suggestions for them. The challenges are prioritized in the roadmap so that the most urgent challenges are the uppermost. Hence, the improvement suggestions are recommended to implement from top to bottom in the roadmap. Every improvement suggestion should have a nominated owner who would take care of improvements in practice.

	Challenge	Improvement suggestion
Time ↓	Processes are not followed by sales people	New meeting practices for contract and currency issues
	Cost estimations lack relevant information	Currency basket template into use
	Roles and responsibilities are unclear in project's opening	Described process of project opening into use
	Resources in mega controlling aren't enough	Project or business controllers to take responsibilities of mega controller
	Importance of currency hedging isn't understood	Trainings about currency hedging
	Cost estimators are not aware of controllers' needs	More communication between controllers and cost estimators
	Cost estimations lack currencies for procurement	Transparency of currencies in cost estimations
	Responsible purchasers are unclear to trade finance	Highlighting purchases in project's kick off
	Direction handbook is difficult to navigate and follow	Updating Direction handbook to be more user-friendly

Figure 19. Roadmap about main challenges found during the research and improvement suggestions for those

The research revealed also that the role of the mega controller wasn't very clear among stakeholders. Also, the latest mega controller herself was unsure about her responsibilities in many processes. As a result of this research, a process description is made about financial processes in the sales and project's opening phases. The process description is found from Appendixes B and C. It illustrates the responsibilities of different stakeholders and clarifies the roles in these phases.

9.2 Theoretical contribution

Financial processes from controller's point of view in large projects are not handled in previous literature. Thus, this research fills the gap in the literature by providing a comprehensive case study around the subject. Also, this research provides a case study about the role of a project controller in large projects (mega controller), which is not studied a lot.

This study revealed that project members don't always follow their responsibilities. Hence, the research provides interesting addition to the mega project literature which

says that inflexibility is one of the reasons behind performance problems in mega projects (Loch et al., Miller and Hobbs, Miller and Lessard, Morris, Winch, cited in Sanderson 2012), because this study suggests that one of the main challenges arise because sales people have too much flexibility in their work. Then again, this research supports the study of Koppenjan et al. (2011) which says that a balance between strict control and flexibility is the key success factor. This study supports the previous literature also in communication point of view. Communication is found very important in previous literature (e.g. Van Marrewijk et al. 2008), and also this study suggests that main challenges are related to lack of communication.

9.3 Evaluation and limitations of the research

The objectives of the research were met by answering research questions. Earlier research from this specific topic wasn't found from the literature so literature review was made from wider topics. However, the literature review was beneficial for the study and it helped to link the results of this research to the existing literature.

The reliability of the research was enhanced by interviewing widely different stakeholders and supplementing the interview results with secondary data. Thus, the reliability of the thesis can be assessed to be on a good level. However, the replicability of this thesis is more difficult to achieve. When assessing the replicability of this thesis, the nature of a case study should be kept in mind. The research is conducted at one point of time in a quickly changing environment which causes difficulties to replicate the study. However, transparency of conducting this research is tried to keep on a high level which facilitates the replicability.

Because the research philosophy of this study was interpretivism, subjectivism in results is inevitably present. However, the effect of this was tried to minimize with methodological choices of the study. Still, wide generalizations from this study cannot be made because this study is made only in one organization. However, it provides a useful case for future research.

9.4 Suggestions for further research

Financial processes in large projects are not studied very widely. To make deeper conclusions about financial processes in large projects, more research is needed around the topic. Especially, the role of controller in large projects should be studied more widely. This study suggests that the controller of large projects should participate more actively

in the sales phase of the project to bring different functions closer to each other. However, research is needed about this kind of role in other organizations as well.

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APPENDIX A: INTERVIEW TEMPLATE

1. Opening:

- a. Ask permission for recording
- b. Introducing interviewer and the study

2. Background of the interview:

- a. What are your responsibilities at the case company?
- b. What is your role in mega projects?
- c. How much experience do you have from mega projects?

3. Role of the mega controller:

- a. What are the responsibilities and tasks of the mega controller in different phases of the project?
- b. How would you describe the current state of project controlling in mega projects?
- c. What expectations and wishes do you have for the mega controller?
- d. Is the amount of cooperation with the mega controller at a convenient level?
- e. How would you improve controlling of the mega projects?
 - At the sales phase?
 - At the project opening phase?
 - At the delivery phase?

4. Specific processes of mega controlling:

- a. Do you see any improvement themes in
 - creating the project structure for mega projects?
 - currency hedging process in mega projects?
 - defining terms of payment for mega projects
 - defining contract structure

5. Challenges in mega projects:

- a. Have you noticed any challenges in the financial processes of mega projects?
 - Which project was it?
 - What were the main factors causing these challenges?
 - What concrete actions could have been taken to tackle these challenges?

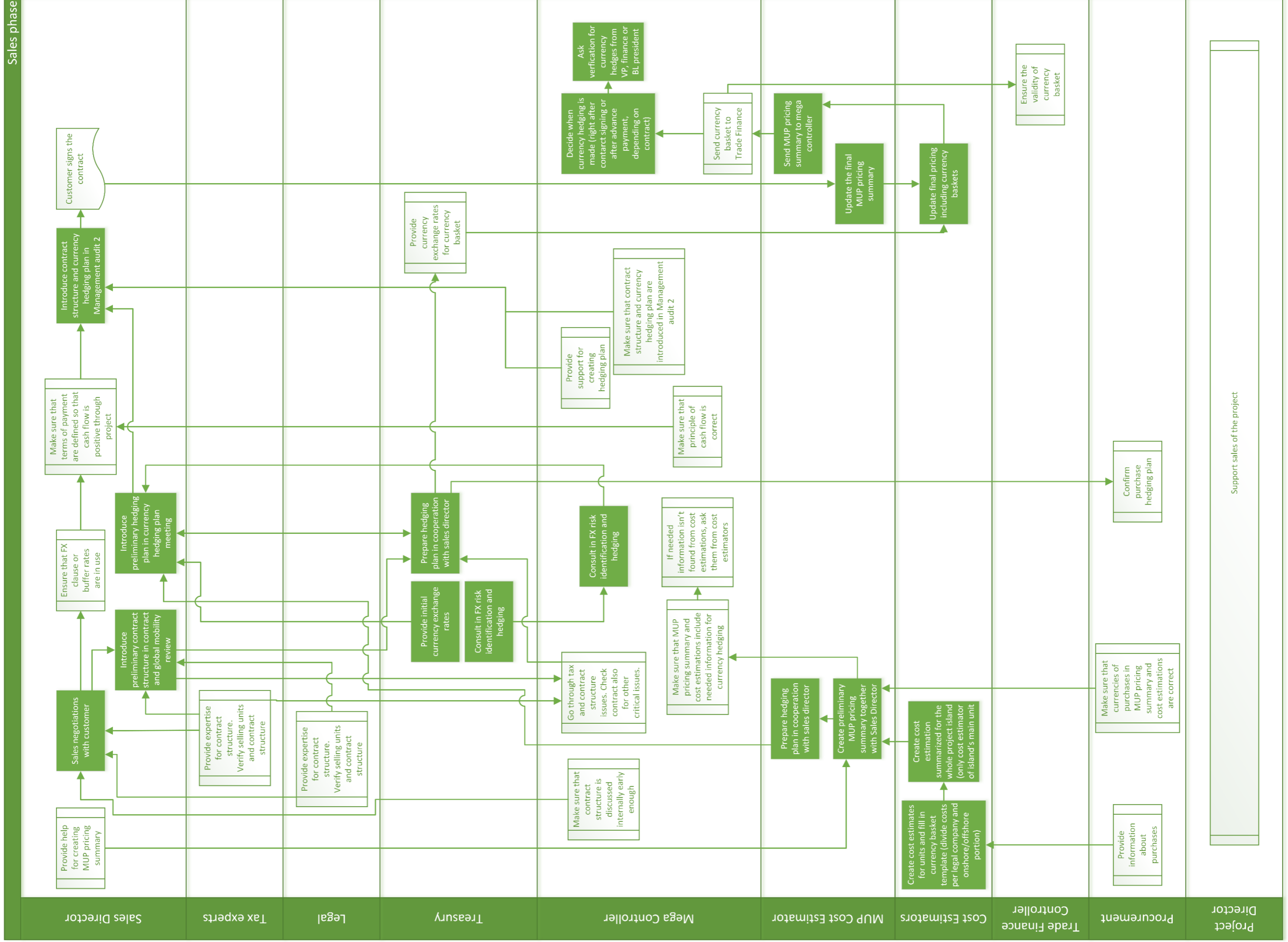
6. Positive remarks about mega projects:

- a. Is there some part of the financial processes that works smoothly, and you are satisfied with?

7. Closing

- a. Is there anything more you want to say or ask?

APPENDIX B: PROCESS DESCRIPTION (SALES PHASE)



APPENDIX C: PROCESS DESCRIPTION (OPENING PHASE)

