

# CHALMERS



## Construction Management in practice

- Perspectives of CM utilisation in Sweden

*Master of Science Thesis in the Master's Programme Design and Construction  
Project Management*

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Department of Civil and Environmental Engineering  
*Division of Construction Management*  
CHALMERS UNIVERSITY OF TECHNOLOGY  
Göteborg, Sweden 2013  
Master's Thesis 2013:21



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## ABSTRACT

One key factor for any successful project is to choose the right project delivery method. In the construction industry there are several ways to implement a project and a client have several aspects to consider before choosing the most appropriate method. Construction Management (CM) is one way to execute a project where the client and a CM-organisation work together to implement the clients project objective. CM can basically be described as the project delivery approach where the client employs a CM-organisation in order to assist the client and to coordinate all activities in the project. The design-build contractor or general contractor is replaced with the CM-organisation that always should have the best interest for the client in mind and executes the client role and responsibilities. A fundamental idea with CM is that the client has the ultimate responsibility and takes the risks in the project, often resulting in lower costs.

This master thesis has the purpose to describe a general understanding of CM and to study CM practises. During the thesis nineteen interviews have been done with project managers representing CM-organisations, clients of the studied company and prime contractors in an on-going project. Further, the thesis is primarily focusing on one company working with CM in the western part of Sweden and how to facilitate this company's continuing work with CM. The view of CM differs geographically in Sweden, in Stockholm the concept of CM is more widespread and used more frequently. Therefore companies operating in Stockholm are also included and their practises are compared to the studied company's.

The findings from the interviews indicated that the practises of CM in Sweden conform. Issues that was highlighted by the interviewees was the importance of early involvement of the CM-organisation, having the appropriate organisation and be located on the construction site. The view of the remuneration to the CM-organisation and the use of incentives slightly diverged among the interviewees. Further, the findings emphasise the way that the companies handle risks and responsibilities in their projects, along with characteristics of the more suitable projects and clients. Finally, the findings from the interviews and the literature study are compared, discussed and some recommendations to the company are given.

Key words: Construction Management (CM), project delivery methods, construction industry

Construction Management i praktiken  
– Perspektiv på användning av CM i Sverige

*Examensarbete inom Design and Construction Project Management*

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## SAMMANFATTNING

En viktig faktor för ett lyckat projekt är att välja rätt genomförandemetod. I byggbranschen finns det flera olika metoder att välja på och en beställare ha flera aspekter i åtanke innan valet görs. Construction Management (CM) är ett sätt att genomföra ett projekt där beställaren och CM-organisationen arbetar tillsammans. CM kan i princip beskrivas som en genomförandeform där beställaren använder en CM-organisation för att få hjälp i alla beslut och för att samordna alla delar i projektet. Total- eller general-entreprenören ersätts av en CM-organisation som alltid agerar utifrån beställarens bästa och med andra ord agerar som om de vore beställaren. En grundtanke med CM är att beställaren har det övergripande ansvaret och tar alla risker i projektet vilket kan resultera i lägre kostnader.

Detta examensarbete har som syfte att ge en generell förståelse av CM och studera hur CM används i praktiken. Nitton intervjuer har genomförts med projektledare i CM-organisationer, beställare till det studerade företaget och entreprenörer i ett pågående projekt. Vidare, fokuserar examensarbetet främst på ett företag som arbetar med CM i Västsverige och hur detta företag kan fortsätta arbeta med CM. Synen på CM har geografiska skillnader i Sverige, i Stockholm är begreppet CM mer utbredd och används oftare. Därför har även företag verksamma i Stockholm också intervjuats och deras sätt att arbeta med CM jämförs med det studerade företaget.

Resultatet från intervjuerna visar att CM används på liknande sätt i Sverige. Frågor som betonades av de intervjuade var vikten av tidig involvering i projektet av CM-organisationen, att ha en tillräckligt stor organisation och att vara placerad och tillgänglig på byggarbetsplatsen. Synen på ersättningen till CM-organisationen och användningen av incitament var något som skilde de intervjuade åt. Vidare betonar resultaten hur företagen hanterar risker och ansvar i sina projekt samt vilken typ av projekt och beställare som är mer lämpliga för CM. Slutligen är resultaten från intervjuerna och litteraturstudien jämförda, diskuterade och några rekommendationer till företaget ges.

Nyckelord: Construction Management (CM), genomförandeformer, byggindustrin

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## **Preface**

This master thesis is the final part of the authors' education at Chalmers University of Technology in Göteborg. It is also our master thesis for a degree from the master program Design and Construction Project Management. The thesis presented is based on a literature study concerning Construction Management (CM) as a project delivery approach and interviews with a total of six companies working with CM. In the process three clients and four prime contractors have also been engaged. The study had been carried out from January 2013 until May 2013 at the company Bygg-Fast. This thesis is related to their work to develop and market CM.

A first and big thank you goes to the employees at Bygg-Fast's division in Göteborg for welcoming us at their office, where most of the work has been carried out. Especially thanks to our supervisor Oskar Lindström, the business unit director Sten Moberg and other employees at Bygg-Fast that have supported us during the thesis. We also greatly appreciate the assistance and comments from our supervisor and examiner at Chalmers, Göran Lindahl.

Last but not least, we wish to thank all those who we interviewed during the thesis process and specially the other five CM-organisations that shared their experiences. Without the help and information from all interviewees this master thesis would not have been possible.

Göteborg May 2013

Sandra Berg & Sandra Persson



# 1 Introduction

A necessity when a client intends to implement a construction project is to choose the most suitable project delivery method and contracting form for the project. A contract is an arrangement between the involved actors in a project and can be seen as a tool in how to handle project risk. A project delivery method is on the other hand describing how to achieve project completion from initiation to finished building. The choosing of the right project delivery method might be difficult and therefore the client needs to consider several aspects in the project before a decision can be made. Which method the client chooses should be based on project priorities, responsibility allocation, financial possibilities and how the risk should be shared among the involved actors.

When the client have chosen the method and implementing company e.g. a main contractor, this company has a commitment to deliver the project within the specifications set in documents and contracts. The commitment entails certain obligations for the chosen company that sometimes may be hard to pursue due to difficulties to strive against the client's project objectives. A challenge in all projects is the financial aspect e.g. to meet the client's needs in building cost effectiveness rather than with lowest price. Construction Management (CM) is one way of implementing a project where the client and company are working together in consensus to fulfil project objectives.

In literature concerning CM or in different encyclopaedias on the Internet there is no unique definition that once and for all states what CM is. Often the term construction management is used broadly in the construction industry to describe a variety of professional management services, which is not describing CM as a project delivery method. However, due to many involved in the process, several interpretations of CM have developed around the world and resulted in different variants of CM with both similarities and differences. Common for most of the variants is that CM is a project delivery method where the client contracts a construction manager in order to coordinate all activities from planning and design, to construction and completion of the project (Oyegoke, 2001). The fundamental idea with CM is that the construction managers always should act and work in the best interest of the client which sets CM apart from other delivery methods.

CM began to develop in the middle of the 20<sup>th</sup> century when the construction industry went through large changes (Kluenker, 2001). Projects become more complex, the profit margins for the contractors narrowed and the roles in the construction industry were changed. There was a need for a new project delivery approach and in the same time CM was developed simultaneously around the world. In Sweden, Åke Larson Byggare AB is often credited as the first company in Sweden using CM (Linder, 1980). Today, several companies are working with CM in Sweden and they are often considering Åke Larson as a role model and forerunner. However there are geographically differences, in Stockholm the CM-approach is a more prevalent concept than in the rest of Sweden. Therefore some companies in Stockholm have specialised themselves in delivering projects using mainly CM. In this master thesis the focus is to compile and develop a company's way of working with CM in the western part of Sweden, especially in the Göteborg region.

## 1.1 Purpose

This master thesis has the purpose to explore the project delivery approach Construction Management and to compare and analyse approaches to try and define the concept of CM. Further, it aims to study how companies in Sweden are approaching and work with CM. The literature in the field of Construction Management will be reviewed and compared to the actual practise from the interviews in order to improve Bygg-Fast's way of working with CM. To facilitate their development, other companies using CM as a project delivery approach in Sweden will also be included in the study. In other words, the main idea is to evaluate Bygg-Fast's approach to CM and give recommendations on how to further develop their CM practices.

In order to achieve the purpose, the objective with this master thesis is to:

- Study CM, both theoretical and practical, in different companies to find different approaches of working with CM.
- Describe how companies in Sweden work with CM and how the companies view the Swedish market.
- Contribute with an input regarding CM to companies in Sweden concerning how they can spread and increase CM in the construction market.

## 1.2 Limitations

This master thesis takes its starting point in the Swedish construction industry. The focus is on housing and construction works rather than infrastructure project delivery methods. The study will include one company, operating in the western part of Sweden, where project managers and their clients are being interviewed. As a complement, other companies working with CM are questioned and they are limited to those in *CM-bolagen*, an industry association for companies active within the field of CM.

## 1.3 The studied company, Bygg-Fast

In this master thesis the company Bygg-Fast AB operating in the western part of Sweden is studied. Bygg-Fast is a consultancy organisation specialised in project management and property development. The company is divided into two subsidiaries, one working with project management in various forms and the other is developing properties. Bygg-Fast was founded 1979 in Borås and is today acting substantially in the western part of Sweden with offices in Malmö, Helsingborg, Halmstad and Göteborg. Recently in spring 2012 two new offices was opened, one in Stockholm and one in Linköping. Today Bygg-Fast has approximately 60 employees working at the offices around Sweden. There are currently two shareholders holding 75 % of Bygg-Fast while the rest is owned by the employees.

Already from the beginning, there has been a fundamental idea at Bygg-Fast that they should both build and manage their properties. Early in the development the founders decided that they should not do the construction by themselves and this was the starting point for their working method, the CM-approach. Bygg-Fast wanted to offer its clients a complete business model instead of competing for the best price and always be on the client's side in the project. Today, all projects that Bygg-Fast implements in their property development use CM. They have also implemented several CM-projects in collaboration with their clients.

Bygg-Fast provides their clients with a professional knowledge and helps them with both commercial and technical advises in the development of the clients' property portfolio. Furthermore, Bygg-Fast distinguishes from other consultancy organisations because they implement their own projects. Therefore, Bygg-Fast offers the client an overall approach and has the experience of being on the client side. In this master thesis three reference projects, with Bygg-Fast as the CM-organisation, was studied. The CM-projects differ from each other in size, complexity and level of experienced client. Among the projects there is one currently on-going and there are both new construction and refurbishment projects.

## 1.4 Disposition of the thesis

This master thesis consists of six chapters which together constitute our knowledge-base on Construction Management. Below the chapters are briefly described to explain the main content of each chapter. The structure and working process of the master thesis is further illustrated in, Figure 1.

**Chapter 2 – Frame of reference**, provides a theoretical frame for the master thesis based on a literature study. In this part different project delivery methods are described followed by a deeper compilation of Construction Management.

**Chapter 3 – Method**, defines the method that has been selected and utilized during the process of the master thesis. Further, the chapter describes of how the data was collected and analysed.

**Chapter 4 – Findings**, presents the results deriving from the conducted interviews. The chapter is divided into six parts based on the literature study and the answers from the interviewees.

**Chapter 5 – Discussion**, is the chapter where the findings from the interviews are discussed and analysed with support from the theories in the *Frame of references*.

**Chapter 6 – Conclusion and recommendations**, has the purpose to conclude the master thesis and make recommendations to the company.

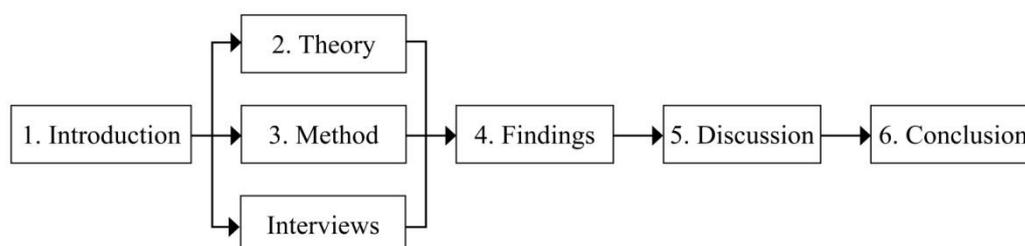


Figure 1, The structure and working process of the master thesis.

## 2 Frame of Reference

In order to view CM in the relevant context, this chapter starts with presenting the two traditional project delivery methods, design-build and design-bid-build. Further, the approach of partnering, where the aim of better relations between the actors is similar to the ideas within CM, is described. The major part of the chapter aims to give a thorough view of CM. In the end CM is summarised and compared with the other delivery methods. During the whole chapter there is an assumption that the readers are familiar with the basics of the construction industry.

### 2.1 Defining project delivery methods

When a construction project is executed there should be an emphasis on selecting the project delivery method that is most suitable for the project. A project delivery method describes how the client, designers and contractors are organised during the project in order to complete the project (Jackson, 2010). The method need to be design in order to meet the client's objectives in the best way and deliver a satisfying project (CMAA, 2007). What method the client selects should be based on their project priorities and how the responsibilities and risks are allocated among the involved actors (Höök, 2005). The relationships, roles and responsibilities between the actors can vary significantly depending on the used project delivery method (Alberta Infrastructure, 2001). It is further essential to consider the client's management capability, time of project delivery and financial aspects.

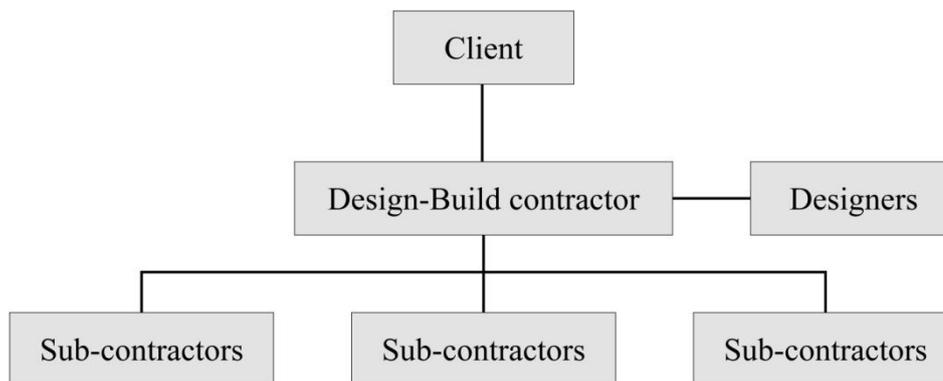
In the publication *An owner's guide to Construction Management* edited by Construction Management Association of America (CMAA, 2007) several issues of what a client should consider when choosing a project delivery method are presented:

- *The project time*, whether the project needs to be completed quickly or if outside conditions is claiming short delivery time.
- *Flexibility in the project*, considering possible changes and the extent the client wants to be able to influence the different project phases.
- *Preconstruction service*, if the client needs assistance in the defining and planning of the project regarding cost, time, quality and safety.
- *Interaction in the design phase*, reflecting the understanding that the client has concerning the design phase including project complexity and cost impacts.
- *Financial aspects*, how the project will be financed and the effects the financing will have on e.g. schedule, type of contract, and risk.

After consideration of these aspects the client should choose the project delivery method that is most suitable for the project and meet the client's requirements in the best possible way.

### 2.1.1 Design-build

Over the last ten years the design-build delivery method has faced a major growth in popularity both in Europe and the United States (Jackson, 2010). The method is associated with a single-contract project where the client only contracts with one contractor. This contractor, the design-build-contractor is responsible for both the design and the construction of the project (see Figure 2). However, the contractor is able to use in-house resources or sub-contract both the design and the construction (Oyegoke, 2001).



*Figure 2, Organisational structure and actors involved in a design-build contract - The contract and communication relationships in a design-build agreement.*

In a design-build project the client transfer the control and responsibility to the design-build-contractor in accordance to the client's requirements (Kenig, 2004). The selection process of a contractor can either be negotiated or competitive based on price, time and qualification (Hardin, 2009). The tendering requirements consist of outline design and specifications which will be the basis for the project design provided by the contractor (Potts, 2008). To be able to start the construction the client has to approve the design. Further, the design-build-contractor is responsible for all documentation including design errors and is also the one taking the risk for the construction (Hardin, 2009).

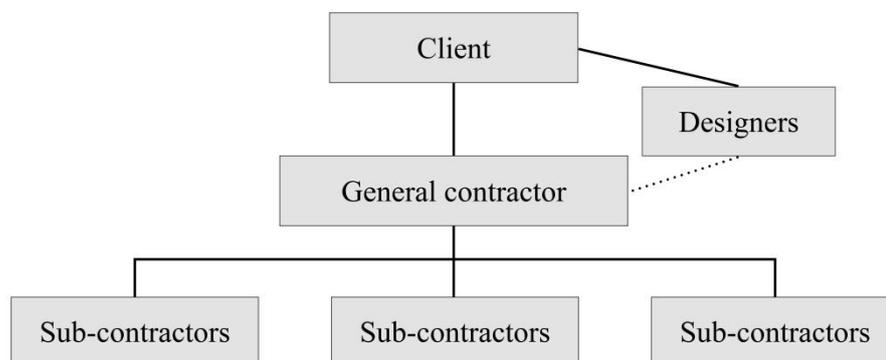
One of the advantages with the design-build method is the early involvement of the design-build-contractor in the project (Jackson, 2010). This enables communication and integration between the designers, engineers and sub-contractors that works together as a team (Hardin, 2009). As a result this facilitates integration and overlapping of the design and construction phases and the project might be completed earlier to a reduced cost (Jackson, 2010). A drawback with design-build as a project delivery method is that the client may lose control over the design of the project (Potts, 2008). The client needs to define the project scope early in the process and if any changes are made during the construction it might be expensive for the client.

### 2.1.2 Design-bid-build

Design-bid-build is the project delivery method that by many authors e.g. Hardin (2009), Jackson (2010), and Oyegoke (2001), are seen as the traditional way of delivering projects. This method has a linear process starting with the client hiring a design team of architects and engineers (Hardin, 2009; Jackson, 2010). The team develops the design and prepares complete construction documentation for the project. Further, a selection of contractors is handed the documents in order to provide the best price.

Based on the documentation the contractors prepare and deliver a tender for the project. The client considers the tenders evaluating the qualifications and price and thereafter contracts the most suitable contractor. This contractor, the general contractor, is then responsible for the construction of the project according to the documentation (Oyegoke, 2001). The construction is often made by the general contractor and its sub-contractors.

In design-bid-build projects the client holds two separate contracts; one with the design team and one with the general contractor (see Figure 3). In this arrangement the control of the project is retained by the client who in turn needs the knowledge and resources required to manage the project in their organisation (Hardin, 2009). All interactions between the design team and the contractor must be managed and led by the client (Jackson, 2010) and in some cases it may position the contractor as an adversary to the client and the design team (Haltenhoff, 1986).



*Figure 3, Organisational structure and involved actors in a design-bid-build contracts - The contract and communication relationship in a design-bid-build agreement. The dotted line indicates a communication path with no contractual relationship.*

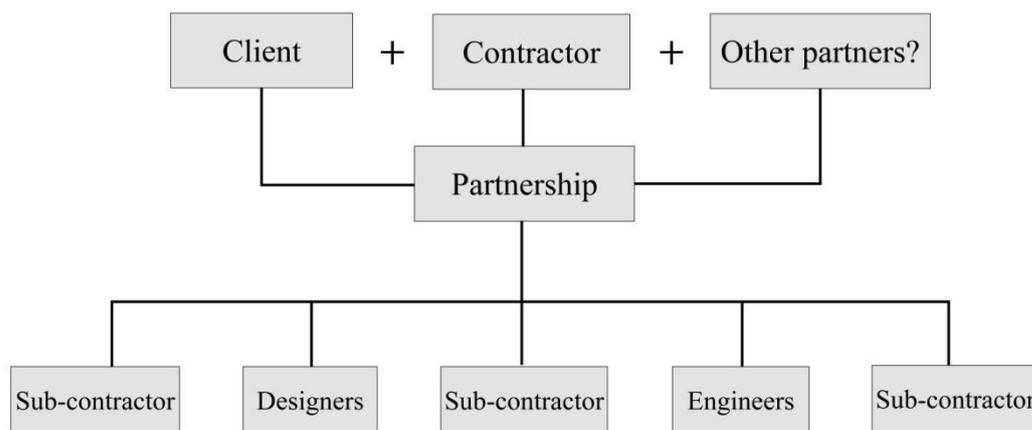
In a design-bid-build project the client have a high degree of certainty of the total cost of the project (Potts, 2008). However, the design-bid-build method has its drawbacks, mostly originating in the linearity of the process. When the general contractor is not involved in the planning or designs of the project they have no possibility to provide management and constructability input early in the project (Walker & Hampson, 2003). Clients applying this method also assume that cheaper is better and that the competition in the tendering process will provide the best prices (Hardin, 2009). In the focus on price; project quality, ability to perform, and collaboration skills are often forgotten. Furthermore, the general contractor is only contracted to perform in accordance to the tendering documentation. Any change during the construction phase or error in the documentation is the client's responsibility and may cause additional expenses for the client (Hardin, 2009).

### **2.1.3 Partnering**

As a project delivery approach, partnering has its origin in the traditional industry and was introduced to construction about fifteen years ago (Hindersson, 2012). The reason for bringing this approach up here is that the partnering philosophy is closely related to the one of CM. The literature often refers to the definition of partnering set by the US Construction Industry Institute (CII), however, it is generally agreed among the authors in the field that there is no common use of this definition (Bygballé, et al.,

2010). Partnering is divided into two parts; strategic and project partnership. Strategic partnership refers to a long term relationship that spans more than one project while project partnership is a short term commitment during one project (Bygballe, et al., 2010; Hindersson, 2012).

Partnering is basically described as a long-term commitment between two or more organisations where a common objective is set to be achieved (Bygballe, et al., 2010; Eriksson, 2010; Gadde & Dubois, 2010). In a partnering project each participant is able to contribute with its expertise and resources to the project (Potts, 2008). In order to achieve the goals, a change in the traditional relationships and boundaries between organisations is required. The partnering organisations need to have a shared culture, the same values and expectations, and the relationship have to be based upon trust (Bygballe, et al., 2010; Gadde & Dubois, 2012) Regardless which organisation the actors work for, everyone should work with the best interest of the project in mind (NCC, 2013). There should be a situation in which all actors can benefit and where open books is a key element. Further, an example of an organisational structure and the involved actors in a partnering project is shown in Figure 4.



*Figure 4, Organisational structure and involved actors in partnering - One possible arrangement between the involved actors in a partnering project.*

By using partnering in construction projects the time for the project might be reduced due to early involvement and integration of contractors and suppliers (Bygballe, et al., 2010). Partnering promotes a collaborative business relationship with improved performance that is based on best value rather than lowest price (Potts, 2008). All projects are not suitable for partnering, however, complex projects with high uncertainty; long project time and high time pressure are most suitable (Eriksson, 2010).

## **2.2 Construction Management**

In this part of the thesis, CM as a project delivery approach is described. The background of CM, the key elements and other basic aspects are handled. The different variants of CM is included, however, the focus will not be on the variants. Instead the aim is to provide a general understanding of CM and the practical use of the approach.

### **2.2.1 The emergence of CM**

In the middle of the 20<sup>th</sup> century the construction industry went through large changes (Kluenker, 2001). Projects became more complex in several aspects such as technical, size and logistics, and the contractors were forced to specialise in different structures or systems. The main contractor went from performing most of the construction work themselves to sub-contracting more and more of the work to the specialised contractors.

Around the same time, in the 1960's and 1970's, US clients were facing chronic problems with their projects (Kluenker, 2001). Projects over budget and behind schedule became more common than uncommon in a time of high inflation. For the contractors the tendering process became tougher and the profit margins were narrowed. In order to submit a low tender the contractors had to take advantage of design errors and missing parts in the documentations. When obtaining the contract, the contractors were able to make claims for all work absent in the documentation but required to complete the project. Otherwise the contractor would not make any profit on the project.

At this time, the design professional's roles were changing due to new financial structures and changes in the market that made them diminish their roles during the construction phase. The architect that used to be the US client's agent left and the contractor ended up in a business relationship holding a higher risk (Kluenker, 2001). This, in combination with the issues in the tendering process, resulted in an adversarial relationship between the contractor and the client.

To overcome all the problems there was a need for a new contracting system and the Construction Management profession emerged in different parts of United States simultaneously (Kluenker, 2001). The prime driver behind CM was the clients who wanted knowledge in construction on their side. The construction manager became the client's agent responsible for managing the client's best interest during the project. The CM approach was based on the belief that teamwork might reduce the adversarial conflicts existing in the construction industry (Oyegoke, 2001). Furthermore, the CM-organisation replaced the main contractor in packaging and tendering the work at specialised contractor level (Kluenker, 2001). The contractual relations were changed when former sub-contractors became prime contractors to the client, all coordinated by the CM-organisation.

The following years the Construction Management approach evolved resulting in different variants of CM. The above described variant is often referred to as Agency Construction Management (Kluenker, 2001). In order to receive the best value US clients begun to contract both an agency construction manager and a main contractor (Kenig, 2004). This resulted in a new variant, Construction Management at-risk, that combines the positive qualities of the two organisational types. The construction industry in United Kingdom observed that the industry in the US performed better and their management techniques were studied (Murdoch & Hughes, 2001). The differences between the countries made it impossible to fully adopt the approach and there-

fore Management Contracting, where the management contractors hold very little risk, was developed. The UK construction industry had difficulties in embracing this variant which led to a purer variant of CM, just called Construction Management in UK.

In Sweden, CM is often referred to as ‘mycket delad entreprenad’ (much divided contracts) (SABO, 2013). The first Swedish company using CM was Åke Larson Byggare AB founded in 1963. The originator Åke Larson’s business concept was that the client and the contractor should be collaborators instead of counterparts (Linder, 1980). Among their project repertoire where CM has been used there are the SAS headquarter in Stockholm, Aker Brygge in Oslo, the Ark in London and Astra’s American headquarter in Boston. In 1986 Åke Larson Byggare was awarded ‘the Swedish service company of the year’ by Dagens Industri for ‘*their way of successfully separating the technically and managerial expertise in the construction process*’.

## 2.2.2 Variants of CM

Although there is no agreed definition of CM in the world of construction four distinguishing variants have been developed. Two of the variants, Agency Construction Management and Construction Management at-risk, are used in the United States and the other two, Management Contracting and Construction Management, have been developed in United Kingdom. Below there is a short compilation of each of the four variants. Finally, to summarise some of the differences between the CM variants the client risk and involvement in contracts are compared in Figure 5.

**Agency Construction Management** (Agency CM) is a construction management variant where a construction manager is hired to assist the client in all decision-making processes during the project (Jackson, 2010). It is a fee-based agreement between the client and the Agency CM organisation where the construction manager should not have any conflicts of interests with the client (Oyegoke, 2001). Thereby the Agency CM-organisation is seen as an extension of the client’s own organisation (Kubba, 2010). Further, all contracts in Agency CM with the involved actors are held directly with the client (Jackson, 2010).

**Construction Management at-risk** (CM at-risk) is an agreement between the client and the CM at-risk organisation, which entails a commitment for the construction manager at-risk to deliver the project within a guaranteed maximum price (GMP) (Hardin, 2009). This is the price negotiated between the CM at-risk-organisation and the client where the client agrees to reimburse the costs for the work up to a ceiling amount (Kenig, 2004). The CM at-risk-organisation has dual roles in each project. First in the planning and design phase the CM-organisation works as a consultant in the development of the project and thereafter during the construction as a general contractor, in order to deliver the project within the GMP.

**Management Contracting** (MC) is where a main contractor is contracted for its management expertise to manage a project (Oyegoke, 2001). The manager gives the client advises in the design phase concerning issues of constructability, planning and cost (Anon, 1984; Murdoch & Hughes, 2001). The MC-organisation does not perform or are responsible for any work during the construction, but the manager is coordinating all the work (Murdoch & Hughes, 2001). In MC the client contracts with designers and the MC-organisation. Further it is the MC-organisation that, after approval from the client, contracts with the prime contractors.

**Construction Management** (CM in UK) is the variant where a construction manager is hired in a project, as a consultant in the role as the client's representative or agent, in order to manage the process (Murdoch & Hughes, 2001). During the planning and design phase the CM in UK-organisation assists the client in developing the project. In CM in UK the construction manager are responsible for managing and coordinating all work on-site but does not take any risk. All contracts are held between the client and each of the prime contractors performing the construction work (Murdoch & Hughes, 2001; Oyegoke, 2001).

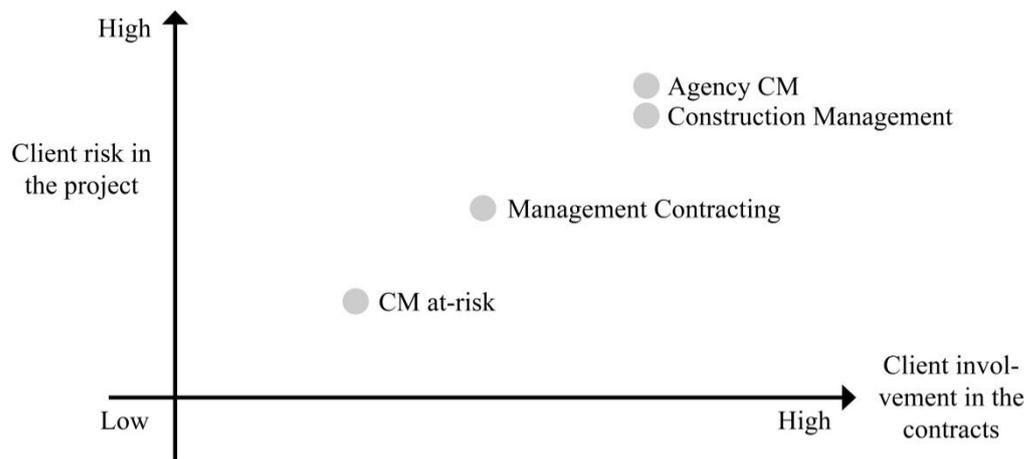


Figure 5, Client risk in different CM variants - The graph indicates the client risk in a project compared with how much the client is involved in the contracts.

### 2.2.3 CM application

The use of CM is most suitable in large and complex projects that need an overview and coordination (Kubba, 2010). However, the use of a construction manager it is not limited to a certain size of projects (Kenig, 2004). A construction manager is preferred if the client does not have in-house expertise in design and construction. The construction manager will then help the client in controlling costs and avoid delays in the project (Kenig, 2004). Furthermore, CM is beneficial on projects where the client wishes the design to be carried out by an independent architect or design team (Murdoch & Hughes, 2001).

Alberta Infrastructure, a governmental organisation in Canada, specified in the publication *An Owner's Guide to Using the 'Construction Management'* (2001) when it is advantageous to use CM:

- *Complexity*, when the project is complex or a refurbishment project where the users may occupy the building during the project.
- *Time*, when the project time is critical or it is essential to have a specific completion time resulting in significant operational savings.
- *Special design*, when the design is extraordinary or innovative and an early involvement in the project is required.
- *Flexibility*, when the client has difficulties in deciding all requirements early in the project.
- *Market conditions*, when the market in the location of the project is rapidly changing.

## 2.2.4 The use of CM in practice

All clients may not have the knowledge required about how to accomplish a construction project. When clients like this still want to keep the entire responsibility by themselves, they can hire a construction manager. The use of CM is not, by itself, a separate construction project delivery method (Kubba, 2010). It may be seen as a resource the client might use in order to provide knowledge in a construction project and represent the client during the project (Potts, 2008).

A construction manager is contracted to control and coordinate all activities in a project, from planning and design to the construction completion (Oyegoke, 2001). The manager assists the client in contacts regarding involved actors and will be involved in the administration of the work. (Linder, 1980; Oyegoke, 2001). Throughout the project a team approach is applied, where the construction manager is leading the team of designers, prime contractors and the client (Potts, 2008). This allows the client to be increasingly involved while maintaining a higher degree of control. A necessity is that the client's objective is shared and pursued by the construction manager (Potts, 2008).

What role the construction manager undertakes depends on the applied variant of CM. In Agency CM and CM in UK the manager acts as a consultant in the best interest of the client, and thereby has no conflicts of interest with the client. The manager is in the variants able to offer advices that are unbiased and may be seen as an extension of the client's organisation (Kubba, 2010). In Management Contracting the client is hiring a main contractor in order to manage the project (Murdoch & Hughes, 2001). The three variants; Agency CM, Management Contracting and CM in UK, have distinct similarities while the construction manager in CM at-risk-project distinguishes in the role the manager has in the project. In this variant the CM at-risk-manager is working as a consultant to the client during the design and planning phase and when the construction phase starts the manager's role in the project changes (Jackson, 2010). The CM at-risk manager then becomes the general contractor similar to the role of a contractor in a design-bid-build contract. Thereby the relationship between the client and CM at-risk manager change leading to a contradiction between the manager acting in the client's best interest and the need to deliver within the guaranteed maximum price for getting any profit (Oyegoke, 2001).

Depending on the client's in-house expertise and the objectives of the project a construction manager may provide vital elements to the project (Kubba, 2010). It is important to have clear communication regarding responsibility areas and boundaries throughout the whole project (Rawlinsson, 2006). The roles need to be clear, in order to provide a base for construction manager to perform according to their commitment and for the client to transfer the responsibilities to the construction manager. Before the collaboration between the client and the construction manager starts both actors need to take time to understand and determine the planned project process (Haltenhoff, 1987). Furthermore, the additional cost with a construction manager needs to be weighed against the potential benefits the manager brings to the project (Kubba, 2010). When using CM 'value for money' is more important for a successful project than simply securing the least possible final cost (Murdoch & Hughes, 2001).

One key element to the success of a CM-project is early involvement of the construction manager (Haltenhoff, 1987). If the client brings in a construction manager early in the process it enables a deeper understanding for the manager and a possibility to have a direct dialogue with the design team. To integrate the prime contractors early

in the project process also adds value and facilitates the work during the project (Hardin, 2009). Problems that may occur early in the project can be identified and corrected before the problem causes any damages to the project, such as delays, cost overruns and quality issues (Kubba, 2010).

In a CM-project there are other considerations to take into account as opposed to traditional projects. The client needs to be sufficiently informed and involved in all project phases in order to achieve the project objectives (Haltenhoff, 1987). In the design phase, the construction manager provides the client with advice concerning issues of constructability, planning and cost (Anon, 1984). It is essential to identify difficulties in the design phase to minimise problems later in the project (Rawlinsson, 2006). Having a construction manager already from the beginning of a project provides continuity throughout the project and allows overlapping of design and construction (Anon, 1984; Potts, 2008).

Fast-tracking is a concept used to accelerate the work by overlapping the design and construction phase (Jackson, 2010). The concept aims to progressive design of the project with the effect that the construction is possible to start as soon as the essential design is finished (see Figure 6) (Rounds & Segner, 2011). An advantage by using fast-tracking is that the overall time required for design and construction can be significantly reduced. The continuous design also facilitates a larger flexibility by allowing late changes in client requirements and design (Murdoch & Hughes, 2001). On the backsides of fast-tracking there are difficulties when changes need to be made because not all the documentation was finished when the construction started (Rounds & Segner, 2011).

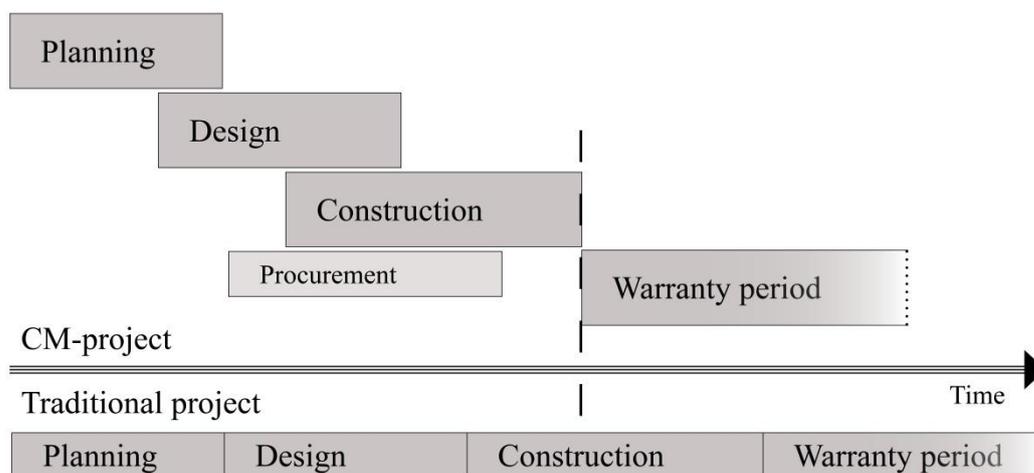


Figure 6, Project phases in a CM-project compared with a traditional construction project - In a typical CM-project the planning, design and construction phases are overlapping.

In the design phase the managers in the different variants of CM have the same commitment to the client. When the project turns into the construction phase the construction manager's role varies. However, in all variants it is important to provide sufficient on-site management throughout the whole construction (Rawlinsson, 2006). In CM at-risk the manager has the role of a general contractor and thereby performs all con-

struction work (Jackson, 2010). In Agency CM, Management Contracting and CM in UK the manager does not undertake any work, instead it is prime contractors that are responsible for the construction (Kubba, 2010). The work is packaged in smaller parts and each package is purchased separately from different prime contractors (Potts, 2008). This is called multiple prime where each prime contractor is responsible for the performance of a part of the work that is defined in their contract (Rounds & Segner, 2011). The construction manager is responsible for coordination, management and monitoring of the progress of the different prime contractors. The packaging of the work can be done either by the client, the construction manager or by the two in collaboration.

The completion and warranty period is not straightforward in CM (Murdoch & Hughes, 2001). When there is no main contractor the client needs to take the overall responsibility even though it is the construction manager that hand over the completed project. The construction manager assists the client with final inspections and collects the required documents from the prime contractors (Kenig, 2004). In a CM-project where the work is packaged and some work packages are finished before the project is complete, the period of liability need to be clearly defined (Murdoch & Hughes, 2001). It can either be when the single packages, made by one prime contractor, is finished or when the whole project is completed.

### **2.2.5 The client view of CM**

It is always the client who decides which project delivery method or approach to use (Jackson, 2010). However, many clients are not adequately familiar with all factors that might have an impact on project success. Rather, they often prefer the traditional methods that they are more accustomed to (Jackson, 2010). The most widely employed project objective in the construction industry is that the clients want to maximize the value for their money (Anon, 1984). On the basis of project priorities, the client's management capability, and potential risk the client will select the project delivery method or approach that is most suitable for their project (Rawlinsson, 2006).

CM is a client-oriented project delivery approach throughout the project (Haltenhoff, 1986). The effort and actions taken by construction managers need to be in the best interest of the client which means that the manager need to see the client's needs in favour of their own. Additionally, the client can be confident that the construction manager will focus on the project objectives rather than managing its own risk in the project (Rawlinsson, 2006). However, the client needs to be careful in selecting the CM-organisation since a CM-project requires a high level of experience and skills of the CM-organisation (Klueker, 2001).

In a CM-project the client is allowed to have a complete and constant involvement throughout the entire project, resulting in a higher degree of control (Potts, 2008). This indeed, requires the client to offer more time and resources on the project and act as a decision maker between the design team and the construction manager (Rawlinsson, 2006). Furthermore, when the client selects the prime contractors there are a higher flexibility towards using a main contractor (Potts, 2008). Consequently, by contracting directly with the prime contractors the client will save money by lower tenders and no supplementary contractor fee (Klueker, 2001; Potts, 2008).

In CM, clients often find themselves in a situation where they do not know the overall cost of the project (Potts, 2008). In the beginning of a project the client has to rely on cost estimates made by the construction manager that are often based on incomplete

documents. Along with the work packages becomes contracted the certainty of the cost will rise (Rawlinsson, 2006). However, every change in the client requirements needs new forecasts to be established in order to estimate the effect that the change will have on the cost. All errors in the documents that will increase the costs for the prime contractors will also affect the overall cost, as these are paid for by the client (Söderberg, 2011).

## 2.2.6 Contracts, responsibilities and risks involved in CM-projects

A central feature of CM is controlling risks in projects. Potts (2008) is arguing that CM is an ideal process for managing risks, as risks can be identified early and be pro-actively managed during the project. The distribution of risk varies between the different variants of CM depending on who is holding the contracts and what role the construction manager has in the construction phase (Oyegoke, 2001). In CM at-risk and Management Contracting the client holds two types of contracts, one with the CM-organisation and another with the designers. In these projects the CM-organisation either performs the work as a general contractor, as in CM at-risk, or contracts sub-contractors as in Management Contracting. In Agency CM and CM in UK the client also holds the contracts with the prime contractors. As the contractual relations change towards Agency CM and CM in UK one contracting tier is removed when the sub-contractors becomes prime contractors (Oyegoke, 2001). Thereby, the client receives a higher contractual complexity in the one to one contractual relationship with all actors in a project (Rawlinsson, 2006).

*Table 1, Risk Table - Risk allocation in the different variants of CM.*

Theme	Agency CM	CM at-risk	CM in UK	MC
<b>Cost risk</b>	Client's risk	Differ (GMP)	Client's risk	MC's risk
<b>Time risk</b>	Client's risk	Differ	Client's risk	MC's risk
<b>Quality risk</b>	Client's risk	CM's risk	Client's risk	MC/contractor
<b>Performance risk</b>	Client's risk	CM's risk	Client's risk	Client's risk

When managing risks it is essential to identify and acknowledge all possible risks as early as possible (Oyegoke, 2001). The risks must be clearly allocated between the actors, to the one that is most appropriate to control them. The overall risk in CM is the risk of negligence that the construction manager is failing in performing their commitment. This risk is a risk that all variants of CM have to consider. The general risks in a construction project, handled in this thesis, are cost, time, quality, and performance, shown in Table 1. The risk of time, cost and quality are easy to understand, however, the performance risk implies the workmanship and defaults of prime contractors.

As a result of the client holding all contracts in Agency CM and CM in UK the client takes all risk (Kenig, 2004). The CM-organisation in Agency CM and CM in UK are responsible for monitoring the risks but bear none of them by their own (Oyegoke, 2001). In MC the management contractor is taking the risk on time and cost (Murdoch & Hughes, 2001). The performance risk is distributed between the client and the prime contractors, which leaves the management contractor with barely any contractual risk. In CM at-risk the construction manager submits a guaranteed maximum

price and therefore acts as a general contractor in the construction phase (Kenig, 2004). This implies that all the risks are allocated to the construction manager at-risk.

The services provided by construction managers vary between and in the different variants of CM. These should be fully defined in the contract between the client and the construction manager (Rounds & Segner, 2011). Furthermore, in the contracts the remuneration for the CM services needs to be stated. There may be a fee as in Agency CM and in CM in UK, included in the guaranteed maximum price as in CM at-risk or as cost reimbursement plus fee as in Management Contracting (Kenig, 2004; Murdoch & Hughes, 2001). The construction manager has the responsibility for managing and coordinating the different work packages on behalf of the client. Therefore it is essential that there is a part in the contracts between the client and the prime contractors mentioning that the construction manager is the coordinator on-site (Murdoch & Hughes, 2001). Further in the contracts there must be stated that all instructions will come from, and that all communication must go through, the construction manager.

### 2.2.7 Summary of CM

To summarise CM as a project delivery approach the largest advantages and disadvantages will be discussed:

- + **Early involvement of the construction managers** means that the managers have the possibility to provide their knowledge already in the planning and design phase. The client can use the construction managers' knowledge both for coordinating and managing the process, and for advice in issues as constructability, planning and in choice of prime contractors.
- + **Contracting directly with the prime contractors** reduces one contracting tier. This might lead to cost savings due to removed supplementary contractor fee and increased competition in the tendering phase. In this way the client will be in a different position towards the prime contractors and has more control over the costs in the project.
- + **The overlapping of the design and construction phases** will shorten the overall project time. The saved time is a result from a planning and design phase that early covers the fundamental design. This means that the construction phase can start as soon as the foundation and frameworks are set and procured.
- + **Possibility for changing** the project requirements far into the process. As there is no main contractor the client can change before the prime contractors for detailed design are procured. If it turns out that a change in already built-in is required the client only has to pay what it actually cost.
- **The extended risks** that the clients need to handle by themselves might be seen as a disadvantage. In another delivery method the client pays a main contractor to take the most of the risks. However, when taking the risk by themselves clients only pays when the risk happens.

## 2.3 Comparison of CM and other project delivery methods

Project delivery methods have four significant differences concerning; the number of contracts the client sign in a project; the relationship and role of each party involved in the contracts; the point the main contractor gets involved in the project and finally the ability for the design and construction to overlap (Haltenhoff, 1986).

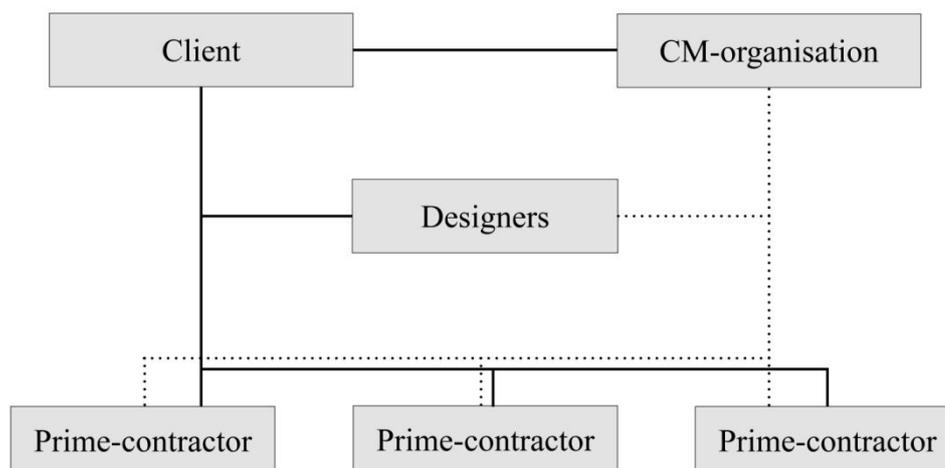
Comparing CM with other project delivery methods, both design-build and design-bid-build uses one independent contractor while in CM prime contractors can be used (Oyegoke, 2001). Partnering can be formed in different arrangements; the structure might be similar to design-build or design-bid-build. However, it is most probable that the main contractor and the client will form an entity together. Further, the financial stake for a design-bid-build contract is in the construction phase while in design-build, CM and partnering stake is in both the design and the construction phase (Oyegoke, 2001). Three of the CM variants (Agency CM, MC and CM in UK) are similar in several ways while CM at-risk differs from the others. CM at-risk is more similar to a design-bid-build contract, with the exception that the construction manager offers preconstruction services to the client during the planning and design phase while in design-bid-build the general contractor enters after the design is settled (CMAA, 2007).

The CM-approach is seen by many as a client-oriented approach, where the client controls its own risk (Haltenhoff, 1986). Compared with independent contractors where the client transfers the risk to a main contractor, a contractor-oriented approach. In partnering, where organisations work together towards a common goal, the risk is divided and shared among the actors (Bygballe, et al., 2010). Some design-build contracts are similar to design-bid-build regarding timeline and schedule, however, design-bid-build have a linear sequence of work while design-build allows overlapping in the design and the construction phase (Hardin, 2009; Jackson, 2010). The fast-tracking system used in CM and partnering has developed the overlapping even further. A study in US, comparing CM with other major project delivery methods, showed that the most significant advantages of reduced project time (13.3 % faster delivery speed) were between CM and design-bid-build projects (Alberta Infrastructure, 2001). Cost and quality were shown to be almost the same or slightly better in a CM-project compared with the other methods.

The basic idea with CM was to develop a project delivery approach where the client and the prime contractors were working together in order to implement a construction project. In the other methods there will always be a contract between the client and the main contractor to use if conflicts will arise between the actors. With CM, where the client is holding all contracts, this is diminished. The client is in CM taking more risks and has more responsibilities in the project. However, the client has the possibility to be more involved in the project compared with other delivery methods. In the end, this will most probably result more work for the client but also enhance the client's total control over its own project.

## 2.4 CM in this study

Bygg-Fast, that further will be referred to as BF, and the other studied actors in this thesis are using a variant of CM that mostly resemble Agency CM or CM in UK. The CM-organisation does not have any vested interest in the project. They are hired to manage and coordinate the project with the best interest for the client in mind. In most of the projects fast-tracking and varying extent of multiple prime is used. All actors, designers, prime contractors and the CM-organisation, in a CM-project are contracted directly to the client. This implies that the prime contractors are working side by side in the construction phase. In this way the communication paths and the contractual relations differ, see the project structure in Figure 7.



*Figure 7, Organisational structure and involved actors in a CM-project in Sweden – The contract and communication relationship in a typical Construction Management approach. The dotted line indicates a communication path with no contractual relationship between the actors.*

In Sweden there are several standard contracts used to procure construction projects. These general conditions have been developed jointly by clients and contractors in Byggnadens Kontraktsskommitté (BKK) in order to allocate risks and minimise conflicts. There are the AB04, *General Conditions of Contract for Building, Civil Engineering and Installation Work* that is used in traditional design-bid-build projects and ABT06, *General Conditions of Contract for Building, Civil Engineering and Installation Work performed on a package deal basis Design-Build* for design-build projects. The difference between the two is that in ABT06 the responsibility for planning and design are included. There is no standard contract for CM; instead these two are used depending on whether there is a functional responsibility (ABT06) or not (AB04). Some adjustments for CM are made to the standard contracts and are settled in the general regulations (AF07).

For consultancy services there is the standard contract ABK09, *General Rules for Consulting Works in Architectural and Engineering Activities*. In Sweden this is the foundation for the contract between the client and the CM-organisation.

### **3 Method**

This master thesis has been performed using a qualitative research method approach aiming to compile and develop BF's way of working with CM. Literature concerning research methods distinguishes between quantitative and qualitative methods. In studies performed with quantitative methods there are large sample sizes in order to quantify the data and statistically find relations or measurable results (Holme & Solvang, 1997). The qualitative method is used to achieve a deeper understanding and a large amount of information is gathered from a small sample size. This method was applied in this master thesis, since qualitative data makes it possible to study information that is not available elsewhere (Silverman, 2006). One of the strengths with the qualitative method is that qualitative studies are flexible and new insights might be gained from the participants that may change the structure of the thesis during the study (Adams, 2010). In qualitative methods there are three main phases: planning, gathering and analysing (Holme & Solvang, 1997). The gathering phase in this thesis project has been collecting primary data from interviews and secondary data from literature.

#### **3.1 Literature study**

It is important to be familiar with the area of research in order to ask relevant questions (Kvale & Brinkmann, 2009). To attain a thorough understanding of CM a literature study was conducted in the beginning of the thesis project. In the search for literature in the studied field, both scientific articles written by professionals in the field and books in the area of project delivery methods have been reviewed. The search resulted in a large amount of literature originating from United Kingdom and United States where CM is more frequently used than in Sweden. The frame of reference is based on articles and books found in the review process and will, in addition to providing a general understanding, clarify the different project delivery methods that are most widely used. The Swedish perspective is covered whenever possible, particularly in the part about delivery methods and contracts. The literature study has also been performed in order to get knowledge of interviewing and different research methods.

#### **3.2 Interviews**

One of the main ways to collect qualitative data is by interviewing. The purpose of interviewing is to integrate different people's experiences and interpretations of the same thing (Thomsson, 2010). To determine BF's way of working with CM and to be able to develop their practices, 15 interviews were conducted. Based on the purpose and objectives of the thesis an interview guide was prepared. The questions focus on CM in general and also how the interviewees perceive some key elements of CM. In order to try the questions and improve the quality of the guide two exploratory interviews were conducted. Further, between the interviews, the interview guide was evaluated and small changes were made in order to adjust the focus in the questions.

The selection of interviewees is a complex issue. According to Kvale and Brinkman (2009) the number of interviewees will be as many that are required to get the 'right' answer. If the number is too small it is hard to generalise and if the number is too large it is hard to make deeper interpretations. In this study the interviewees had to cover all key positions in a CM-project from the client to the project organisation. It is essential to capture different perspectives in order to obtain a comprehensive view of CM. For this reason the interviewee list (see Table 2) also include some other companies working with CM and prime contractors in an on-going project. The interview

guide has been adjusted to suit the different perspectives of CM: personnel at BF, their clients and other companies in the CM industry.

*Table 2, Interview Table – The table indicates the number of interviewees from different perspectives of CM.*

<b>Perspectives</b>	<b>Number of interviewees</b>	<b>Additional information</b>
<b>Personnel at BF</b>	7	Including project managers, site managers and purchasers
<b>BF's Clients</b>	3	From three different CM-projects
<b>Other companies working with CM</b>	5	From different regions in Sweden
<b>Contractors</b>	4	Short questioning on the construction site

The interviews were semi-structured to enable an open discussion around the questions. This allows flexibility, and the progress in the interview was directed from the interviewees answer and inputs rather than from the interview guide. After questions of basic information about the interviewee, the interview started with a general question about CM. depending on the extent of the answer the rest of the interview was adjusted. The interviews lasted approximately 45 minutes and were all held in Swedish in order to get more information and to avoid misinterpretations since everyone's mother tongue was Swedish. All interviews were conducted by two persons, one responsible for questioning and one for observation and ask supplementary questions. To give the interviewers' time to focus on given answers and to ask additional question, the interviews were recorded. Notes were only made to add thoughts and to support the analysis of the answers.

### **3.3 Analysis of interview data**

After the interviews the result was transcribed, although not verbatim. Only relevant answers for the purpose of this master thesis were summarised and analysed to provide a base for the findings. The recording ensures that correct interpretations of the information in each interview were available for analysis. It also makes it possible to go back to the recorded interview, listen again and to include quotations in the findings. In analysing the data from the interviews the data was coded into different themes or elements of CM that made it possible to compare the different thoughts. In order to differentiate between the interviewees from different companies, the companies have been labelled, Company A-E. This was done with no specific order and will not be marked in the thesis.

## 4 Findings

This chapter presents the outcome from the fifteen interviews that were conducted. It is a compilation of the issues brought up in the interviews and the focus is on the content that is linked to the purpose of this master thesis. All interviewees, both the ones working at CM-companies and the clients, have their backgrounds in construction contractor organisations. Among them the age varied between 35 and 55 years and there were two women. Furthermore, their common opinions as well as those only mentioned once, are presented in order to visualise both the wide, and the narrow, span of thoughts.

### 4.1 Defining CM

During the interviews it became clear that defining CM is not an easy task. All interviewees had to take some time to reflect and think before they could shortly describe CM. The overall view is coinciding; the interviewees are mentioning the relationship between the actors in a CM-project, the division of contracts and the involvement of the client etc. Both the interviewees from BF and the ones from other companies agree that CM is not a contractual form like design-build or design-bid-build. It is more seen as a form of project execution or an agreement between the client and the CM-organisation built upon a relation. Åke Larson as an initiator of CM was mentioned by the majority of the interviewees. Some of them have been working at Åke Larson Byggare while others perceived him as a role model.

The words collaboration and trust is mentioned by several of the interviewees about the relationships in a CM-project. If there is no trust, the project will be in trouble and as a client pointed out it is important that *“the thinking has to be us, not us and them”*. An interviewed project manager explained it as the CM-organisation and the client have to make an effort in building the relationship to be able to work together solving all problems. It is important that all actors in a project have the same objectives and vision of the project.

In CM-projects the clients run their projects with the aid of a consulting company that manage all parts of the project. The connection between the CM-organisation and the client are described by the interviewees in different ways. One interviewee said that the CM-organisation is working as the client’s extended arm. Another explained that the CM-organisation is the main contractor in the eyes of the client. A third interviewee related CM to in-house construction where the CM-organisation *“acts as the client’s own construction company”*. In other words the CM-organisation is the client’s part towards the other actors in the CM-project and is carrying out the project as an integrated part of the client’s organisation viewing the project as their own.

A client stated that *“CM is an overall commitment”* from the CM-organisation in the project. A general opinion among the interviewees is that the CM-organisation has no vested interest in the project; they are always working towards the client’s best. One interviewee described the CM-organisation as the umbrella of the project and another that they have to think as the owner. The CM-organisation is hired in order to manage a project according to the client’s wishes and requirements. They bring their knowledge and expertise through individuals into the project in several ways as the client’s advisor. If the client wants, the CM-organisation can take part during the entire project, from the initial idea, over the construction phase as on-site coordinators to the end of the warranty period.

## 4.2 Practical use of CM

In a CM-project the CM-organisation has to be very involved in order to keep all parts of the project together. Control and coordination are key functions in the organisation as well as assisting the client in all their decisions. By many of the interviewees, CM is seen as the ultimate method for running projects, but as one of the interviewees stated:

*“CM is not the solution to all problems in the construction industry, it is important to know what you are doing.”*

This interviewee continues about the importance of having the sufficient organisation on a project. According to all interviewees the size of the organisation depends on the size of the project and the client’s knowledge. The CM-organisation is built upon the requirements from the client, how the contracts are divided and the complexity of the project. However, one interviewee argued that *“too many people involved are not always appropriate”*. As more people in the organisation are more expensive a staffing plan for the project is often established. The interviewee from company D compared the CM-organisation with the organisation at a main contractor and said:

*“Our organisation is as large as the organisation of a main contractor in an identical project but we try to be more efficient.”*

By several interviewees the feature of being able to work as a main contractor is highlighted. Although, all interviewees agree that the CM-organisation should include these professionals (see Figure 8 as an example):

- A project manager that has the overall control of the project and delegates.
- A design manager handling the planning and design phase.
- A building services coordinator.
- Site manager and an adequate number of construction coordinators that runs the construction phase and the daily work on-site.
- A purchaser in charge of purchasing and procurement often in combination of financial control and calculating.
- An administrator whose tasks depend on the client’s in-house expertise.

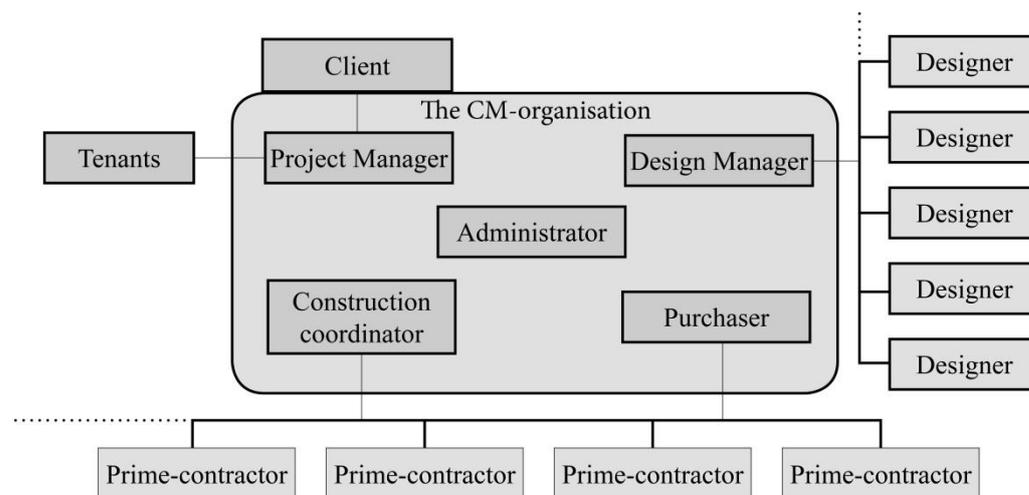


Figure 8, Organisational structure at BF in a CM-project.

Again, the size of the organisation depends on the project, and the number of each professional varies. In large projects there are one or several persons in each position,

and in smaller projects few individuals might have multiple responsibilities. Some of the interviewees further pointed that the planning and design phase and the construction phase should rather be managed by separate persons than a single person. According to a project manager at BF it is easier to divide and delegate the work in larger projects with a larger organisation. However, several interviewees emphasised the importance of having the knowledge in both construction and building services in all levels of the CM-organisation, since buildings become more and more complex.

A common view, raised by all interviewees was the significance of being on-site. The CM-organisation has to be positioned on the construction site and as one interviewee said:

*“As a construction coordinator, you must like to be at the construction site.”*

A client declared that the most important people in a CM-project are the ones working on-site and that it is preferable to have the other managers in the CM-organisation on-site as well or nearby. In contrast, one interviewee from company B claimed that uncomplicated projects might be handled from the office. This argument is not shared by the other interviewees and an interviewee from BF stated that they in their on-going project have focused on always having enough people positioned on-site.

As important as having a sufficient organisation, it is to engage individuals with the right knowledge in the right positions in the CM-organisation. One interviewee mentioned that sometimes the right person is more crucial than the project delivery method. The majority of the consultants in CM-organisations at the interviewed companies have experience from large construction contractor organisation. This gives the advantage that they have the same knowledge as a main contractor in order to run a construction site. The right knowledge in the construction phase is also appreciated by the interviewed prime contractors. The interviewees from BF emphasised the advantages with a smaller company compared to a main contractor. In a smaller company there are shorter decision paths, an open-minded atmosphere and a possibility to customise the CM for individual projects.

On the question on when the CM-organisation should be involved in a project there was a unified answer from all interviewees; *“as early as possible”*. One interviewee preferred to be involved in connection with the initial idea and another when choosing location for the project. A third interviewee said that they normally become involved when the design phase begins. If the CM-organisation enters the project later it is hard to obtain the overall responsibility for the project. When the CM-organisation is hired early they have the possibility to bring their knowledge and thoughts into the project. This implies that the CM-organisation might influence the project early and thereby affect the product and view the cost impact of each decision.

The significance of the management in the planning and design phase must not be overlooked. While the design becomes approved the basis for the project economy is set and the majority of the costs are decided. To maintain the appropriate level of the costs, the client's objectives and expectations need to be clarified early. Further, the budget for the project and an economic forecast must be kept and updated. In order to control the costs, it is important to focus on planning right from the beginning and lead the design team in the right direction. However, the interviewees accentuated that CM is a flexible project delivery approach that allows the client to make late changes in the project. It is also possible to wait with some decisions or re-think the product or certain details to meet the client's objectives. As one of the interviewees mentioned *“the client only pays what the project costs and nothing else”* meaning that the client

are in charge of the costs. Another interviewee contributed that staying with the decisions without regret may help keeping the costs at the expected level.

Dividing the work in smaller work packages or multiple prime was seen by many of the interviewees as an integral feature of CM. One interviewee considered CM as equal to the project delivery method ‘divided contracts’ in the construction phase and another stated that multiple prime is a must have in CM-projects. Usually it is the CM-organisation that divides the work into different work packages and handles the procurement. In the procurement part of a CM-project the multiple prime provides a possibility to lower the costs by involving more prime contractors. The interviewed project managers at both BF and the other companies are agreeing that the savings, compared to other project delivery methods, are between five and fifteen per cent. The project managers’ estimates are strengthened by a client to BF that has used both CM and design-build in equal projects. According to the client’s calculations the savings by using CM are between seven and ten per cent. The direct contracting with the prime contractors, that will be more deeply discussed in chapter 4.3, are also contributing to lower costs by removing intermediaries and the supplemental contractor fee. CM is about “*buying at the source*” as one of the interviewees explained.

How much the work should be packaged and the number of packages was an issue where the interviewees’ opinions slightly diverged. There is a balancing act between the earnings that might be made by dividing much and the cost for coordination and administration of all contracts. Some interviewees mentioned specific numbers of packages that are appropriate for a CM-project while others, in contrast, highlighted the importance of not dividing too much. The number of packages differs from project to project and it is important to find the most suitable number for each project. Some interviewees also expressed the importance of deciding approximately how many packages to use early in the process. The CM-organisation has to use their experience when dividing and as one interviewee clarified:

*“It is not the one that divides the most that wins; it will be the one that divides the best for the project.”*

Among the interviewed prime contractors the reasoning was even more diverging, one found it hard to work when there was too many prime contractors involved and another thought that the work could be divided even more. However, the overall view among the prime contractors was that they appreciated CM as a project delivery approach. Often the work packages are of lesser extent than in traditional projects. This gives the opportunity for smaller and often local contractors to participate also in bigger projects. The result, when smaller contractors may be asked to submit a tender, is procurement in a higher competition and the use of the entire market.

An issue mentioned by many of the interviewees, in connection with the division of work, is the management of the boundaries between the different prime contractors. One key to success in a CM-project is to clarify which prime contractor is responsible for what. According to some interviewees boundaries in CM-project may be hard and might cause problems unless it is handled properly. One interviewee links the difficulty to the number of work packages and states:

*“The more prime contractors involved, the harder it gets to draw the boundaries between them.”*

However, the interviewed prime contractors have not experienced any problems with the boundaries, but believe that it depends on the work package and specialisation of

the prime contractor. Other interviewees neither see the problem but think that people unfamiliar with multiple prime may find it difficult in the beginning. In order to overcome the potential problems, thorough preparations are essential and focus on multiple prime from the beginning of the planning and design phase. Several of the interviewed companies introduce a boundary list early where the different work packages are defined, as well as their content. The design team have to make sure that the boundaries are clear in the documents and that there are no gaps or duplicates between the packages. One interviewed construction coordinator emphasised the fact that the boundaries often are clear on paper but vague in practice, resulting in discussions and on-site decisions. Another interviewee suggests that the boundary issues might be handled by a separate contractor, e.g. a boundary contractor that is working in the boundaries between different packages in order to reduce conflicts.

A general opinion, recurring in all interviews, is the benefit of fast-tracking, the overlapping between the design and construction phases. Fast-tracking makes it possible to start the construction very early. The earthwork may start as soon as the location of the building is set and the foundation castings when the overall design is finished. In other words all details in the project do not need to be defined before the construction phase starts. One interviewee declared that overlapping is "*one of the strongest arguments for CM*". Whether the overlapping saves time for the project or not differs between the interviewees. Some believe that the possible time savings are mostly theoretical while the majority of the interviewees argue that the overlapping shortens the overall time due to a short separate planning and design phase. All interviewees agree that the opportunity for saving time is in the early phases, though the construction phase takes its time and does not become shorter by the overlapping.

During the construction phase the CM-organisation works as coordinators and acts as the link between the involved actors. Due to the direct contracting, one communication intermediary is removed, resulting in according to several interviewees, easier communication paths and a better flow of information. The main communication path in the construction phase, apart from on-site supervision, is scheduled meetings at different levels: with the client and the design team, with the project managers at each prime contractor and with the team managers working on-site. The aim of the on-site meetings is to plan the forthcoming weeks and discuss possible clashes. Often the construction coordinator, that holds the meeting, has the economical mandate to take the required decisions in order to be able to continue the work. As the meetings are documented the decisions become written as well. From the prime contractor point of view, in an on-going project at BF, there are too many meetings with too many people attending. However, the interviewed construction coordinators emphasise the importance of participation at the meetings since they are seen as useful environment for sharing thoughts and questions.

The CM-organisation's commitment often ends with the final inspection and when the warranty period starts. Usually, the CM-organisation assumes the responsibility for the final inspection and to hire inspectors. Then the CM-organisation together with the inspector has the commitment of ensuring that the work is performed according to the documents. Furthermore, it is possible to contract the CM-organisation in order to handle the warranty period. The interviewees argue that the warranty period is easier in a CM-project mostly due to the direct contracting. The prime contractors view the client as their client and are thereby more willing to correct errors as quickly as possible.

### 4.3 Contracts, responsibilities and risks in a CM-project

In a CM-project it is the client who holds all contracts with prime contractors and designers, assisted by the CM-organisation. Usually, it is the CM-organisation who prepares the contracts that later will be signed between the client and each actor in the project. In some cases the CM-organisation might be given a mandate to sign documents and contracts on behalf of the client. One interviewee pointed out that the many contracts will lead to a larger amount of work for the client in contrast to other delivery methods. However, in other delivery methods this will be included in the fee to the main contractor. One interviewee at BF mentioned that the contracts could be held between the CM-organisation and the other actors resulting in a higher required payment to the CM-organisation because of the extended risk.

During all the interviews it emerged that ABK09 is used as the standard contract between the client and the CM-organisation in almost all cases. The prime contractors on the other hand could be contracted with either ABT06 or AB04, depending on whether the prime contractor takes responsibility for the final functionality of their delivery or not. If the ABT06 standard contract is used the prime contractor has the responsibility for the functionality. However, AB04 is the most common used standard contract for prime contractors in a CM-project. It also emerged in the interviews that the general regulation, AF07 governs how the prime contractors should handle securities, insurances and warranties. In most cases the contracts with the prime contractors is formed as a template where small adjustments is made from case to case.

How the remuneration to the CM-organisation should be formed differs between the interviewees. The interviewees at BF claim that payment from the client should be based on a fixed price, while interviewees from other companies in Stockholm argue that payment should always be cost-reimbursable where they are paid by the hour. The interviews also revealed that the use of incentives also distinguish BF from the other companies. Almost all interviewees from BF mentioned the advantages in using incentives in CM-projects while the interviewees from the other companies were not as convinced. One interviewee working at Company A stated that they do not use incentives because it creates an interest for the CM-organisation in the project that will be in conflict with the client's interest. Another interviewee, from Company C, expressed the same opinion but mentioned that they work with incentives if the client insists and in these cases they question the reason for the incentive. If then the client decides to use incentives the interviewee preferred soft values, which are not measurable, to decide whether they will have the incentive or not. An interviewee from BF also shares the view of that a bonus system might be dangerous for the project, and if incentives are used they should include both soft and hard parameters. Further, the interviewee from Company D explained that they rarely or never work with incentives:

*“We will do our best anyway, but if the owner wants cost optimisation in front of long-term thinking then incentives might be preferable”*

The majority of the interviewees mentioned that the tendering documents have to be well-prepared to ensure a better procurement process. Further, the commitments for involved actors should be clearly stated in the content of the contracts. One client to BF, working as a project manager, explained that the commitments between them and BF are stated in the contract but sometimes not clear in practice. Another issue discussed by many of the interviewees was that the boundaries between the prime con-

tractors in CM-projects are hard to define. Therefore a list of boundaries between the prime contractors should be included in the contract.

A majority of the interviewees shared the view that the allocation of responsibility and risk may cause difficulties in CM-projects, as illustrated by the interviewee from company B:

*“Responsibilities and risks is an issue that a CM-organisation always is struggling towards when finding new clients.”*

This is because the client is always ultimately responsible in a CM-project, and it is clear that a CM-project results in a higher risk for the client. Therefore, it is important that the CM-project is built upon trust between the client and the CM-organisation. A project manager at Company B mentioned *“confidence is everything”*, and well-executed CM-projects lead to good reputation and probably new commitments.

The issue of responsibility might be clearly stated in the contractual documents, but in practice it is often not. All actors in a CM-project have to take responsibility for their own work, but as mentioned earlier boundaries between the actors may be hard to define. Therefore an open dialog is preferred throughout the project and all interviewees highlight the importance that all actors in the project have to be fully involved. One interviewee explained that it is important to document all decisions in writing to facilitate for future problems. If then a problem should occur, during or after the project, the client then has an actor to contact. However, the extent of the client's involvement in the project and how the client communicates with the other actors differ among projects and type of client. Although, one client states that all responsibilities is theirs and *“in the end the problems will always come to us”*. The client continues about the involvement of all actors and says that *“we have to work together”* and not think *“us and them”*.

Contractually the CM-organisation does not have any responsibilities but some of the interviewees claim that they feel a personal commitment to the project. Therefore, it entails a certain degree of responsibilities for the CM-organisation. In most cases it is the CM-organisation that prepares and controls the budget throughout the project. Further, if there are any contract variations, the CM-organisation is responsible to handle and approve the changes. They also have a commitment to monitor time-schedules in the project and working conditions on-site during construction. However, the CM-organisation only has a coordinating role on-site and no responsibility for the work performed by the prime contractors. All prime contractors are responsible to fulfil their commitments according to the contract signed with the client. One interviewee from BF stated that it is the CM-organisations responsibility that the construction phase progress as planned and that the prime contractors are not hindered in their work on-site.

Despite the project delivery method used, it is impossible to be protected against unforeseen events that might occur in a project. Some interviewees stated that there will always be a risk when a construction project is implemented, which is illustrated in the quotation made by the interviewee from Company D:

*“There is no one that wants to take the risk in a construction project”*

All interviewees agree that the client is the one taking all risk in a CM-project. Some interviewees explained that design-build-contractors and general contractors approximately add ten to twenty per cent to the fee in order to handle the risk that might appear in a construction project. Working with CM, the client will pay for the risk if it

appears. Some risks with CM-projects are the interfaces of construction and, as mentioned earlier, the boundaries between the prime contractors. If one prime contractor is behind schedule there will be consequences for the following prime contractors. Also if errors appear in the contracts it may be difficult to determine who was responsible if several prime contractors were involved. This makes the boundary list in the contract even more important. Further, the interviewees from the other companies explained that there is a CM-insurance that they use in all CM-project. This insurance implies that the insurance company will investigate which prime contractor is responsible for what if a problem occur.

The only risk the CM-organisation handles is that they might lose their remuneration for their work. Usually, the CM-organisation does not have financial interests in the project and thereby not taking any other risk. The CM-organisation can only be held accountable for their actions if they are acting negligent. The interviewees emphasise that when all actors is responsible for their own work they will automatically take some of the risks. In a CM-project the CM-organisation acts in best interest of the client and is thereby from an external view the ones handling the risk. However without a doubt, it is the client and the prime contractors sharing the risk and the CM-organisation acting as a mediator.

#### **4.4 Application of CM**

A common view among the interviewees is that not all projects can be implemented as a CM-project. However, some of the interviewees mentioned that CM is applicable on all projects, but in some situations it may not be profitable. It was explained that the project has to be of a certain size otherwise the cost of using a CM-organisation will be too high compared with the total cost of the project. The cost derives from that there always are phases that all construction projects have to go through, regardless the project size. Further, one of the interviewees stated that a larger project would not be as vulnerable as a small project. One construction coordinator suggested that if there were templates for all documents to use in CM-projects, CM could be applied at smaller projects as well, but then with a reduced CM-organisation.

One advantage with CM as a project delivery approach is the possibility to make changes during construction. This entails that some types of projects are more suitable than others. Complicated refurbishment projects and highly complex projects are project where CM is favourable to use because not all details are set when the construction work starts. Refurbishment projects are typically preferable, and as one interviewee commented; *“it is impossible to predict what the building is hiding”*. Hence, with CM changes can be made depending on how the project develops as another interviewee stated:

*“CM is superior in refurbishment project where there is a lot unknown in an existing building. Thereby it is possible to start the demolition, evaluate and then design according to what was found.”*

Other projects suitable for CM, mentioned by the interviewees, were projects where the former activities have to continue during the construction. CM is also applicable to commercial buildings where the tenants may have different opinions on how their facility should be designed. Further, the construction can start before the client has tenants to the facilities since there is a possibility to make adjustments afterwards.

Several of the interviewees stated that housing construction is less common with CM. One opinion was that housing often entails new construction where it is easier for the

client to produce tendering documents and thereby a general or design-build contractor is more commonly used. Another interviewee mentioned the coordinating problem on-site on a housing project, where several prime contractors have to precede their work in confined spaces. Other projects not suitable for CM raised during the interviews was simple volume retail construction and projects where the client does not want to be involved during the process.

The interviewees' distinguishes in the opinion about which the most appropriate client in a CM-project is. Some argue that all clients can use CM in their construction project while others suggests that the client need to have experience from the construction industry and be aware of how a construction project is implemented. If the client has no knowledge in construction it will be hard for the client to know what to expect from the final result. Therefore the CM-organisation can offer the client help and knowledge needed to implement the project. One interviewee from BF agrees and said:

*“The client that seldom builds and has little knowledge in construction is most suitable for CM as a project delivery approach.”*

Another interviewee at BF had the opposite opinion and argued that the client need to have a good insight in the construction industry and understand what is provided in a CM-project. This view is also confirmed by one interviewed client who claimed that a client need to be well-informed about the construction industry and have the knowledge in order to build the organisation needed in a CM-project. Further, the interviewee from Company A states that a typical CM client is a large property owner who knows what to expect and require. One suggestion from the interviewee at Company C was that if the client needs to expand its organisation the CM-organisation can provide this service to the client. Thereby, CM will be applicable on all types of clients. Surprisingly, one interviewed client did not know about CM and that their project was implemented as a CM-project. However, the client had nothing to complain about the service provided.

## **4.5 The client view of CM**

*“In my world there is no other choice; I can't imagine how a client can choose another way of implementing a project than with CM.”*

This quotation is from one of the interviewees and indicates how some project managers working with CM feels about the method. However, as mentioned earlier CM may not be applicable on all projects and clients. In a CM-project the client will in most cases have a higher involvement in the project compared with other project delivery methods. With the higher involvement the client entails more influence in the project and will also have the possibility to change the requirements during the progress of the project. Further, the interviewees also highlighted the advantage of cheaper overall cost for a client using CM. The interviewee at company C summarised as follows:

*“If the client wants to build cheap, control and influence the project, then I think CM is superior towards all other delivery methods.”*

When there is no use of a general or design-build contractor the client need to take on more responsibilities and risks. Along with this the client will achieve full insight in the project, though it is important to have clear boundaries between actors. The client needs to have close contact with the CM-organisation through the project and need to

be able to transfer some of the responsibilities to the CM-organisation. The client should not be on-site telling the prime contractors what to do; this is the construction coordinators work. Further, one of the interviewees mentioned that if the client is searching for a secure project it may be hard to convince them to use CM as their project delivery approach.

One fundamental idea with CM, stated by several of the interviewees, is that the CM-organisation always should act in the best interest of the client. During the interview, one client explained that the CM-organisation has to keep all parts together while acting as if they were the client. Further, the client stated that if taking CM to its extreme, the client hires the CM-organisation to make all work and thereby it is not necessary for the client to be involved during the project. However, as mentioned earlier, in order to get a well-executed project the client need to be involved in the whole project process. It is also important with a good relationship between the client and the representatives of the CM-organisation. The CM-organisation and the client should work together with no conflicts of interest and the CM-organisation assists the client in all decisions need to be taken.

The use of CM as a project delivery approach entails both advantages and disadvantages for the client. By using CM the client only has to pay the cost of the total construction and the CM-organisation's remuneration. Compared with other delivery methods where the client has to pay a supplemental contractor fee on the top of the total cost. Consequently, the client also has to take on more responsibility and risk in the project. Mentioned by some of the interviewees was the additional work in the warranty period for the client. The client can chose to use the CM-organisation during the warranty period and then the CM-organisation will assist the client if problems occur. Otherwise the client needs to do the work and run queries against each prime contractor.

A common view among the interviewees was that the client gets a higher involvement in a CM-project compared with other methods. The client is then able to take decisions and fully participate in all project phases and thereby control its own project. However, it was stated by the interviewees that CM is not suitable for all clients. One interviewee at Company C stated:

*“If the client doesn't want to take responsibilities and be involved in the project, CM is not an option and the client can't take the advantages with the use of CM.”*

All interviewees agree that implementing a construction project with CM will in almost all cases involve more work for the client. However, both the interviewed clients and managers at CM-organisations realises the benefits of using CM as a project delivery approach compared with other methods. Further, clients that have used CM are satisfied and continue to apply this approach in their future projects according to the interviewees.

## 4.6 The future of CM

All interviewees are sharing the opinion that the future of CM is bright. The use of CM is increasing and the interviewees believe that CM will develop in a positive way and grow stronger. Due to the distorted market in Sweden, that CM is more widely used in and around Stockholm, one interviewee states that *“CM will not be a standard in the construction industry in Sweden.”* However, the interviewees from the companies working in Stockholm argue that CM will win a larger market share in Sweden. Today, there is a demand for CM in the Stockholm region and they think that there is a potential in other city-regions in Sweden. In order to increase the demand the five largest companies working with CM has introduced and started an industry association. They think is important that they work together, and as one of the interviewees explained:

*“We don’t need to take market shares from each other’s in the association; we take from the other part together.”*

The aim of the association is to market CM in the construction industry as an alternative to the other project delivery methods. They want to present and perform lobbying for CM in the same contexts where large construction contractors are lobbying.

During the interviews the interviewees often compared CM with the other common project delivery methods in Sweden. The general opinion among the interviewees is that CM is a better alternative for almost every project. They think that the competition in the construction industry has narrowed and that there are only a few construction contractor organisations that are able to implement large projects. By CM, smaller consultant companies might become able to run large projects in collaboration with the client and with the help of local contractors. Thereby, the CM-companies create a higher competitiveness on the market affecting the large contractors. In the interviews, partnering has also been mentioned as a reaction on CM from the large contractors. The interviewees see the similarities between the two approaches in the perspective of collaboration and trust. However, they states that in a partnering project a conflict of interest is often created when the budget is set. Further, the interviewees argue that partnering is impairing competition on the market.

## 5 Discussion

In this chapter, the objectives of the thesis will be reflected and discussed based on the interviews in comparison to the frame of reference. During the literature study it became clear that there is a lack of literature concerning CM in a Swedish perspective. However, there is a large amount of books and articles written in the UK and the US. In this literature there is a breakdown into the different variants of CM that do not exist in the Swedish practice of CM. In Sweden there is only one project delivery approach called CM, see chapter 2.4, which makes it a bit troublesome to compare the literature with practice. The differences and similarities between the practice at BF and the other companies will be discussed and support from the literature will be taken when relevant.

It was noticeable when talking with people at CM-companies that they have a slightly biased view of CM. There was once in a while a feeling that there is no objectivity among the interviewees e.g. they had very hard to find disadvantages of CM. However, this master thesis is a gathering and comparison of CM-practises which makes the lack of objectivity able to handle. In the findings the interviewees opinions are compiled and in the discussion they might be questioned.

### 5.1 How to define CM?

There is a common view among the literature and the interviewees that defining CM is problematic. The interviewees had hard to give a brief description and the literature diverges in the variants of CM resulting in an absence of an agreed definition. However, both the interviewees and some authors e.g. Kubba (2010) finds it essential to point that CM is not a separate project delivery method. CM is removing a contractual tier from the traditional delivery methods and thereby the CM-organisation might be seen a resource and representative for the client to use. Already from the initiation, and in all variants of CM, the idea of being at the client's side in all matters in a project has been fundamental. These ideas was also among the most prominent when the interviewees explained their view of CM.

In order to complete a CM-project successfully, a key element is the relationship between all actors especially the one between the client and the CM-organisation. A lot off effort has to be made in the searly phases to build relationships and to make all actors aware of what CM means for the project. Among the interviewees there was a client and a prime contractor that was not aware that the project they participated in was a CM-project. Accordingly they could not describe or define what CM was, however, they could give their view of CM after a short explanation of the fundamentals of CM. Due to the infrequent use of CM it is particularly important in a CM-project that everyone knows what CM is. It is an issue for the CM-organisation to find a way to make clear for all actors, from managers to the craftsmen, what delivery method is used and the consequences for them. The size of the project may entail that many believe that the project is run by a traditional project delivery method and not as a CM-project. Clear explanations in the procurement, clarifications when contracting and informative meetings when starting the work in the project and to create routines for this, is suggestions for how to handle the issue.

## 5.2 How to use CM in practice?

In CM all actors are able to focus on their speciality; the design professionals' design their part and the prime contractors builds, installs, and assembles according to their different contracts. In the middle the CM-organisation has the role to manage the project and ensure that the actors are working towards the same objectives. As Potts (2008) argue, a team approach needs to be applied during the whole project. In general, a CM-project it has more active actors than a traditional project and the forming of the project team, the on-site team and the CM-organisation, is more essential.

The large number of involved actors in a CM-project requires a sufficient CM-organisation. The actors need to be coordinated and controlled, and easily be able to contact the managers in the CM-organisation. Both the interviewees and the literature highlight the significance of having the CM-organisation on-site. Companies working with CM are often consulting companies with employees used to work in the office and seldom visit the construction site. In a CM-project it is necessary to step out of the role as the traditional consultant and become more visible on-site. According to one of the interviewees, as a member of a CM-organisation "*you must like to be on the construction site*". Both BF and the other interviewed companies emphasise that they employ managers that have on-site experience and ensure that the CM-organisation contains as many managers as needed.

As CM can be applied on various projects, the CM-organisation needs to be tailored for the specific project. During the interviews it has become clear that there are some aspects to consider more thoroughly. In order to ensure a single and continuous planning and design phase throughout the project there is a need for a separate design manager in the CM-organisation responsible for the overall coordination of the designers. If there are several managers involved the focus could be fragmented and the follow-up will be brushed aside resulting in higher costs. Later in the project, the design manager may have other functions, however, it is important to remain the attention at the planning and design until everything is finished. Furthermore, in the CM-organisation there must be both managers with knowledge in construction and in building services and it is preferably to separate these functions.

A key to a successful CM-project is early involvement for the CM-organisation. The unison answer "*as early as possible*" from the interviewees speaks for itself when asking the question when the CM-organisation should be involved. These findings correspond with Anon (1984) who argue that the CM-organisation creates continuity in the project when involved from the very beginning. All essential elements of the project are set in the early phases and the CM-organisation could provide the client with knowledge of the cost impact of each decision. Further, it is of more importance to customise the project early to fit in the frames of a CM-project. If fast-tracking is going to be practiced, the designers need to concentrate on the basic design and the design that concerns the foundations of the building to facilitate an early start of the construction phase. The same when multiple prime is going to be applied. The design team has to be introduced to the concept and the work packages have to be defined in the beginning of the project.

When applying multiple prime it is important to work with the definition of the different work packages and the boundaries between them. How much the work should be divided differs between the interviewees. The general opinion is that the division have to be adjusted to the project, the client's capability and the CM-organisation, due to that more work packages implies more work. In connection with the division of work

a boundary list need to be established. The boundary list defines the work packages, their contents and the boundaries between them in order to obtain an overview of the project. This document must be frequently updated and used as a tool for the construction coordinators in their instructions and responsibility allocation with the prime contractors.

Regarding the benefits of multiple prime and fast-tracking, the consensus among the interviewees and the literature is that the concepts save time and money. The findings indicate that a CM-project has approximately 10 per cent lower costs and 10 per cent shorter project time. Further, multiple prime contribute to a higher competition on the market. The division in work packages and the different extent of each package opens the possibility for smaller and local contractors to participate in the CM-project. This entails that the CM-organisation together with the local contractors can compete with the large construction contractors in larger projects.

### **5.3 How to handle contracts, risks and responsibilities in CM-projects?**

In CM-projects the client holds all contracts with the involved actors. This result in more advantages than disadvantages for the client. With this contracting form the client is automatically more involved and has the possibility to influence more in the project. Further, it is also implicated that the client assumes more risk in a CM-project compared with other project delivery methods. However, in a design-build or design-bid-build project, the supplementary contractor fee covers some of the risks that may occur in the project. Indeed, this does not automatically mean that the risk will occur. Furthermore, there is a uniform view among the interviewees that the client has to pay anyway for unforeseen risks in design-build or design-bid-build project, regulated by contract variations. Even though, it is the client who holds all contracts in a CM-project the other actors has a responsibility towards the client to fulfil the commitment stated in the contracts. The responsibility allocation may be clear in the contracts but not in practice. The interviewees mentioned that regardless if the contract is held by them or the client they feel that they have a responsibility. This implies that they take on some of the risks and work as hard as possible.

CM is an ideal process for managing risk, according to Potts (2008), because the risks can be identified early and be proactively managed through the project. The interviewees do not agree entirely. The view among the interviewees is that the risk and responsibilities can be difficult to handle in CM-projects. Further, one interviewee stated that *“no one that wants to take the risk in a construction project”*. The inconsistency between the literature and findings may be based on different approaches on the assumed risk issue in CM-projects. Potts (2008) mean that CM is the ideal way of managing risk while the interviewees refer to the risk the client takes in a CM-project. In a CM-project most actors work on the same tier and therefore it is easier to delegate responsibilities. Further, as Potts (2008) mentioned, the early involvement in the project enables identifying risks earlier in the process. The client will take a higher risk in a CM-project but it will also be easier to manage the risk that may occur during the project.

The view on the remuneration to the CM-organisation differs between the interviewed companies. Some are paid hourly while others have a fixed-price fee for their services. Careful considerations have to be taken before the decision is made on which form to use. If the requirements in a CM-project are clearly stated early in the process

it could be preferable to use a remuneration based on fixed-price. However, one basic idea with CM is that decisions should be possible to make late in the process. If they are paid hourly, the CM-organisation has a possibility to provide the services required through the project, without compromising with the payment. As a consequence, when using this form of payment is that the responsibility allocation between the CM-organisation and the client must be clearly stated early in the process.

Whether incentives should be used in a CM-project or not is also distinguishes between the interviewed companies. Incentives could be used in order to enhance the performance of the involved actors. All companies, except BF, refrain to use incentives in their CM-project and further claims that *“we will do our best anyway”*. To use incentives motivates the actors to work even harder in order to reach the project objectives. However, it might also create a small conflict of interest between the client and the CM-organisation. The result will be that the client and CM-organisation are not striving for the same objectives in the project and the fundamental idea with CM is lost.

## **5.4 What projects and clients can CM be applied on?**

All interviewees were agreeing that not all projects are suitable to be implemented as a CM-project. Some critical factors discussed were project size, client organisation and client experience. These findings do not correspond with Kenig (2004), who argues that CM is not limited to a certain size of the project. Some of the interviewees stated that it will be possible to implement all construction projects as CM-projects but it might not be profitable in all situations. The interviewees mentioned that since there are always some phases that all projects need to go through, CM becomes too expensive compared to the size of the project. In small projects the savings are lesser than the remuneration to the CM-organisation.

It came clear in both literature and interviews that CM is most profitable to use on large and complex projects that have a need for a more comprehensive view and coordination. Complex projects demand a higher knowledge that is easier achieved in a CM-project. The benefits of using CM in refurbishment project were also discussed by some of the interviewees. In refurbishment project it is hard to know everything beforehand and in CM it will be easier to make changes during the process compared to other project delivery methods. In the other methods most details has to be set before the demolition and construction can start. Furthermore, CM is also preferable if activities have to continue during the refurbishment. Then it is possible coordinate the work and makes adjustments according to the on-going business.

One issue with CM raised during the interviews was projects regarding housing construction. Some interviewees mentioned the problem when many professional have to be working in confined spaces as in housing construction. In other word, there might be coordination problems when different disciplines are performing work at the same place in the same time. Further, housing construction projects has almost equal parameters from project to project and usually regards new construction. Therefore clients may prefer to use a design-build or general contractor in these projects. However, the use of CM in housing construction could have positive effect on the project. The client can be more involved and able to influence the project and the total cost might be lower for the completed building.

What type of client that is most suitable for CM distinguishes between the interviewees. Some claims that the client needs to have experiences from the construction in-

dustry while others argue that all clients can use CM in order to deliver a project. This is not supported by Kenig (2004), who argue that CM is preferable for clients who do not have any in-house expertise in design and construction. The construction manager then offer helps in unfamiliar situations for the client. However, it could be preferable if the client have earlier experiences in construction. If they have no previous experience of construction they might not know what to expect in a design-build or design-bid-build contract. In CM the CM-organisation will work to support the client in all situations which is not necessarily the case in the other methods. It is also essential that the client is able to transfer the responsibility to the CM-organisation. If the client is highly experienced in construction the client might act on own authority and take initiatives not supported by the CM-organisation. Therefore in some situations it may be preferable for the CM-organisation if the client has lack of knowledge in construction and allows the CM-organisation to perform all work.

## 5.5 How do clients view CM?

The use of CM implies other obligations for the client that differs from when using a design-build or general contractor. According to Jackson (2010) a client prefers traditional methods that they are most accustomed as opposed to trying new methods. If the client decides to use CM for their project it usually entails more work for the client. It will further provide the client with more ability to influence and a possibility to have a complete control over the project. With the use of a design-build or general contractor the client will not have the same control and thereby leave their project in the hands of the contractor. However, as mentioned earlier it is not suitable to use CM in all situations and as one of the interviewees said: *“If the client doesn’t want to take responsibilities and be involved in the project, CM is not an option and the client can’t obtain the advantages with the use of CM.”*

To show the advantages with CM to a potential client can be difficult since CM is hard to define and the argument must be strong. Most clients are more familiar with other project delivery methods and it will be hard for the CM-organisation to promote CM since there are few clients that use it. If the client do not feel confident from the beginning with the use of CM it will be hard for the organisation to convince the client to use CM in their project. However, all construction projects involve some uncertainty and it will be hard for the client to feel completely confident with all project delivery methods. During the interviews it also came clear that the representatives from CM-organisations are confident with CM and it might give a biased view on use of CM in the construction industry.

As a consequence to the possibility to make changes during the project, it will be hard to determine the final cost for the project early in the process. This will enhance the uncertainty even more for client. However, this was not seen as a problem among the interviewees. Instead, they promoted the benefits for the client over the drawbacks concerning CM. It is also stated both in the literature and among the interviewees that the total cost for the construction will usually be lower in a CM-project compared with other delivery methods.

## 5.6 What is the future for CM?

During the interviews partnering was highlighted as the large construction contractor organisations' response to the CM-organisations work with CM. The basic idea in partnering is to work towards the same objectives, an approach similar to the one in a CM-project. Many of the interviewees had earlier experiences from large construction contractors. They mentioned that a partnering-project and a CM-project resembles each other in the early phases. However, they argued that once the budget is set in a partnering-project conflicts of interest between the actors arise. In a CM-project this will be avoided by the CM-organisation acting in the best interest of client. The way a CM-project is implemented with multiple prime differs from a partnering-project. In partnering, a design-build contractor often enters as a partner and thereby the opportunity for the client to influence the project is reduced.

During the years the popularity of CM has changed. A question is if CM is a trend or not. The interviewed companies in Stockholm have developed the CM-approach and are today a competitor on the market. Why this is not the case in other parts of Sweden is hard to say. CM most often consists of typical project, with size and complexity, that might be more common in Stockholm compared with the rest of Sweden. Another reason could be that the western part of Sweden, and typically Göteborg, has a tradition of design-build projects. In order to strengthen CM as a project delivery approach in this part of Sweden, marketing is a key factor. Further, it is important to show potential clients recent project that has been successfully implemented with CM.

## 6 Conclusion and final recommendations

In this master thesis CM practices at BF have been studied and compared to other companies and literature within the field. Generally, the practising of CM at Swedish companies is consistent and the interviewed project managers have a similar view. In some aspects the interviewees' thoughts diverge or are very coherent and it is from those aspects that the CM-companies can learn and develop. Further, the practice of CM is in line with the literature disregarding the different variants.

The conclusions drawn are divided into project-specific and company-specific recommendations. First the project-specific are presented:

- When choosing project delivery approach, CM can be an alternative for all clients. There is no type of clients that are identified as more suitable than others. Therefore, CM is preferable to use whether the client is knowledgeable of construction or not.
- CM can be used in all types of projects. The most appropriate projects are the ones that are large and complex. Refurbishment projects have shown to be ideally suited for CM.
- Projects intended to be CM-projects are preferably adopted to CM early. The design team have to be introduced to the concepts of multiple prime and fast-tracking. The division into work packages have to be performed early allowing the design team to prepare the documents to CM. Further, the design team need to be lead in directions preparing an early start of construction.
- The division of the work into work packages is preferable to results in a list in which all work packages are defined. The boundaries between the different work packages need to be specified in the list as well as how they should be handled. The list has to be introduced early, be updated frequently and be used as a tool for the construction coordinators in their daily work.
- In the CM-project the work is facilitated if all involved actors have knowledge of CM and the differences to other project delivery methods. It is particularly important that the actors know that the on-going project is a CM-project.

After finishing a CM-project it is important for the CM-organisation to take time to reflect and learn in order to facilitate their future work with CM. All construction projects are unique and to store knowledge are essential. For a company working with CM storing knowledge must be done frequently due to the focus on the individuals. Hereafter, the company-specific recommendations follow:

- All individuals in a company need to have clear and common view and knowledge base concerning CM as a project delivery approach. A workshop can be used to enhance that everyone will be informed of the companies way of working with CM. On the workshop the focus could be on the advantages of using CM, typical pitfalls, characteristics etc.
- In the tendering process with a potential client the remuneration to the CM-company need to be thoroughly considered. The company could be paid hourly or with a fixed price. Both systems have advantages and disadvantages and the CM-company and the client need to agree on what form to use. The same concerns have to be taken whether incentives should be used in the CM-project or not.

- The CM-company need to be able to change the structure on the CM-organisation during the project in order to meet changes in the requirements for the project. It is hard for the company to estimate the final outcome of the project. To provide the project the right CM-organisation could both implicate that there is enough recourses as well as the right competence.
- In the CM-organisation the roles and responsibilities must be clear and allocated to the most suitable manager. It is important to have someone in charge of the planning and design phase and to include knowledge of both construction and building services in the CM-organisation. Further, it is essential that the CM-organisation is located and visible on the construction site.
- Having clear company strategies on how to market CM both towards clients and other companies.

To summarise, this master thesis is based on interviews with managers and clients involved in CM projects. If additional interviews had been conducted also with other actors, not familiar with CM, it would most probably have been disagreements about the approach on CM. However, a general opinion is that the construction industry in Sweden is ready for an extended use of CM.

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## **8 Appendix**

*Appendix 1* – List of included companies (pp. 42)

*Appendix 2* – Interview Guide (pp.43-45)

*Appendix 3* – Swedish summary to the employees at BF (pp.46-47)

## **8.1 List of included companies**

Bygg-Fast AB

CO-Pilot Bygg- och Projektledning

EBAB

Forsen Projekt AB

Gina Tricot AB

IKEA Fastigheter AB

Kanico AB

Projektbyrå Stockholm AB

Projektgaranti AB

## 8.2 Interview Guide

- 1) Vad har du för bakgrund?  
*# What is your background?*
- 2) Har du arbetat i något CM projekt?  
*# Have you been involved in any CM-project?*
  - a) Skulle du kunna beskriva de projekten?  
*# Could you describe the projects?*
  - b) Vad har du haft för roll/arbetsuppgifter i dessa projekt?  
*# What role or function did you have in these projects?*
- 3) Kan du förklara kortfattat vad CM är enligt dig?  
*# Could you briefly describe CM according to your perspective?*
- 4) Hur bygger man upp en CM-organisation?  
*# How is an organisation in a CM-project structured?*
  - a) Hur ser arbetsfördelningen ut?  
*# How is the division of labor structured?*
  - b) Vilka befattningar deltar?  
*# What positions in the organisation are participating?*
    - i) Vem gör vad?  
*# Who is responsible for what?*
    - ii) Kan du ge exempel på ett projekt?  
*# Could you give an example of an organisation in a CM-project?*
- 5) Vad är utmärkande för ett CM-projekt med tanke på processer/steg/faser?  
*# What is characteristic for CM-projects concerning processes and phases?*
  - a) Vad görs i vilket skede?  
*# What is performed in which phase?*
  - b) Hur ser gränserna ut mellan de olika ut? Sker det överlappning?  
*# How are the boundaries between the phases defined? Is there any overlapping?*
    - i) Hur långt in i projektet projekteras det?  
*# How far into the project continues the planning and design phase?*
    - ii) Hur sker upphandlingen och inköp?  
*# How is the procurement and tendering handled?*
    - iii) Hur styrs produktionsfasen?  
*# How is the construction phase controlled?*
    - iv) Hur ser gränsdragningarna ut mellan olika entreprenader?  
*# How are boundaries between different contractors handled?*

- 6) Hur fungerar kommunikationen ut mellan övriga aktörer i ett CM-projekt?  
*# How does the communication paths work between the involved actors in a CM-project?*
- a) Beställare  
*# The client*
  - b) Konsulter  
*# The designers*
  - c) Entreprenörer  
*#The prime contractors*
  - d) Myndigheter  
*# The government*
- 7) Hur ser kontrakten i ett CM projekt ut?  
*# How is the contracts formed in a CM-contract*
- a) Hur skiljer sig innehållet i de olika kontrakten?  
*# What is the differences in the content of the different contracts?*
- 8) Vilka risker/ansvar tar en CM-organisation?  
*# What responsibilities and risks does a CM-organisation take?*
- a) Vem tar ansvar för vad?  
*# Who is responsible for what?*
    - i) Beställare  
*# The client*
    - ii) CM-organisation  
*# The CM-organisation*
    - iii) Entreprenörer  
*# The prime contractors*
  - b) Hur kontrolleras:  
*# How is (i-iv) controlled?*
    - i) Kostnader  
*# The costs*
    - ii) Tid  
*# The time*
    - iii) Slutprodukt/Kvalitet  
*# The end product/Quality*
    - iv) Arbetsmiljö  
*# The working conditions*
- 9) Vilket skede i projektet ska CM-organisationen anlitas anser du?  
*# When should the CM-organisation be involved?*
- a) Vilken nytta gör tidig involvering?  
*# What is the benefits with an early involvement?*
- 10) Varför tror du att en beställare anlitar en CM-organisation?  
*# Why do you think a client employs a CM-organisation?*
- a) Vilka försäljningsargument har ni för att en beställare ska välja CM?  
*# Which selling argument do you have to convince a client to use CM?*

- 11) På vilka projekt/beställare anser du att CM är till fördel att använda som en genomförandeform?  
*# On what type of projects/clients do you think CM as a project delivery approach is profitable to use?*
- 12) Vilken respons har ni fått från beställare där ni använt er av CM som en genomgående form?  
*# What response have you received from clients that have been using CM?*  
a) Positivt och negativt?  
*# Positive and negative?*  
b) Har ni haft återkommande beställare?  
*# Have you had recurrent clients?*  
c) Har ni någon typ av uppföljning efter avslutat projekt?  
*# Have you had any follow-up after finishing the project?*
- 13) Vilka för- och nackdelar ser du med CM som en genomförandeform?  
*# What advantages and disadvantages do you consider with CM as a project delivery approach?*
- 14) Varför tror du ert företag arbetar med CM?  
*# Why do you think your company are working with CM?*
- 15) Hur ser ni på framtiden med CM?  
*# How do you consider the future of CM?*  
a) Inom företaget.  
*# Inside the Company.*  
b) I byggbranschen.  
*# In the Construction Industry?*
- 16) Finns det något mer ni vill tillägga om CM?  
*# Is there anything you would like to add about CM?*

### 8.3 A summary in Swedish to the employees at BF

Construction Management (CM) är en genomförandeform som bygger på att ett konsultföretag anlitas, för att representera och agera i en beställares intresse i alla situationer. CM-organisationen kan därmed ses som beställarens förlängda arm i projektet. I CM upphandlar byggorganisationen alla delentreprenader, som då blir sidoentreprenörer till varandra, och ansvarar sedan för att styra dessa under projektets gång. Alla kontrakt skrivs däremot mellan beställaren och entreprenörerna. Mellan beställaren och CM-organisationen skrivs ett konsultavtal där organisationens och beställarens åtaganden regleras. Dessa kontraktsrelationer, som skiljer sig från andra genomförandeformer, medför ett större risktagande för beställaren som då blir ytterst ansvarig.

Överlag finns det lite litteratur skriven om CM och i synnerhet om hur CM fungerar och används i Sverige. Globalt finns det fyra olika former av CM som började utvecklas under 1960-talet, då det skedde stora förändringar i byggindustrin. I Sverige ses Åke Larson, och hans företag Åke Larson Byggare AB grundat 1963, som det första företaget i Sverige som använde sig av CM som genomförandeform. Åke Larson hade en grundtanke att beställaren och entreprenörerna skulle samarbeta istället för att vara varandras motparter. Noterbart är att vid ungefär samma tid grundades Bygg-Fast AB, med liknande grundtankar om att beställaren och entreprenörerna skulle samarbeta genom projekten. Bygg-Fast fick inte samma publicitet som Åke Larson som belönades med flera priser genom årens lopp. Dock lever Bygg-Fast vidare som företag idag till skillnad från Åke Larson Byggare AB som såldes av och lades ner i början av 2000-talet.

Här nedan sammanfattas den litteraturens som finns om CM i för- och nackdelar med CM som genomförandeform:

- + **Tidig involvering av CM-organisationen** medför möjlighet att tillhandahålla kunskaper redan i projekteringsfasen. Beställaren kan använda sig av CM-organisationens kunskaper både för att koordinera och styra projektet samt rådgivning i beslut angående produktionsfrågor, planeringsfrågor och vid val av sidoentreprenörer.
- + **Kontrakt direkt med sidoentreprenörerna** reducerar ett kontraktsled. Detta kan leda till kostnadsbesparingar på grund av att entreprenörspåslaget tas bort och en ökad konkurrens i upphandlingsfasen. Genom denna kontraktsform har beställaren ha en bättre utgångsposition gentemot sidoentreprenörerna som medför ökad kontroll över kostnaderna i projektet.
- + **Överlappning av projekterings- och produktionsfasen** medför en totalt kortare projekttid. Den sparade tiden kan ses som ett resultat av att all projektering inte behöver vara färdig innan produktionen startar. Det betyder att så fort designen är bestämd i grova drag kan schaktning, rivning och grundläggning starta.
- + **Möjlighet att göra ändringar** i projektet långt in i processen. Eftersom det inte finns en huvudentreprenör kan beställaren göra ändringar innan upphandlingen av delentreprenörerna sker. Om det visar sig att beställaren vill göra ändringar i något som redan blivit byggt får beställaren betala den faktiska kostnaden för dessa ändringar.

- **Den utökade risken** som beställaren måste ta kan ses som en nackdel. I andra genomförandeformer betalar beställaren huvudentreprenören för att ta en del av riskerna. Däremot, när beställaren tar en större egen risk i projektet behöver denne bara betala för de eventuella kostnaderna med risken endast om den skulle inträffa.

Detta examensarbete bygger på en kvalitativ studie där målet har varit att sammanställa och utveckla Bygg-Fast sätt att arbeta med CM. För att jämföra och utvärdera den litteratur som finns skriven om CM har totalt 15 intervjuer genomförts. Det har främst varit intervjuer med anställda på Bygg-Fast men även fem andra företag som arbetar med CM har medverkat samt tre av Bygg-Fast's kunder. Dessutom har fyra mindre intervjuer genomförts med sidoentreprenörer under ett pågående projekt på Bygg-Fast. Intervjuerna har sammanställts och senare använts som underlag för en diskussion samt rekommendationer till Bygg-Fast.

Under intervjuerna blev det tydligt att alla som arbetar med CM har en gemensam bild av att genomförandeformen först och främst innebär att tillgodose kundens intressen i projektet och alltid agera utifrån detta. Däremot fanns det svårigheter bland de intervjuade att beskriva och förklara kortfattat vad CM är. Detta är självklart inte lätt då det finns lite svensk litteratur skrivet i ämnet. Ofta kom Åke Larson på tal men tydliga svårigheter fanns i att definiera begreppet. För att ytterligare förstärka detta fanns det till och med en beställare och en sidoentreprenör som inte hade en aning om vad CM står för. Dock kan det tilläggas att de var nöjda med det sätt som projekten hade genomförts.

I det stora hela kan sägas att litteraturen och de svar som framkom under intervjuerna stämde någorlunda överens men det fanns vissa skillnader i hur risker hanteras och vilken typ av projekt det passar in på. I och med att kontrakten hålls direkt mellan beställaren och sidoentreprenörerna medför detta ett högre risktagande för beställaren. CM kan även medföra kostnadsfördelar för beställaren. När entreprenaderna delas upp i mindre delar ökar konkurrensen och fler entreprenörer har därmed möjlighet att lämna anbud. Entreprenörspåslaget som tas bort bidrar också till lägre kostnader för beställaren.

Genom att dela upp projektet i mindre delar gör CM applicerbart på fler typer av projekt. Med CM som genomförandeform finns möjligheter att utföra stora projekt för ett litet företag. Om dessa projekt istället skulle genomföras med total- eller generalentreprenad finns endast ett fåtal möjliga aktörer för detta i Sverige. Det betonades även av de flesta intervjuade att CM speciellt är bra att appliceras på stora och komplexa projekt då projektering kan fortlöpa under byggnationen och stora möjligheter finns för ett flexibla arbetssätt. Andra typiska CM projekt som nämndes av de intervjuade är renoverings- och ombyggnadsprojekt. I dessa projekt finns det mycket som är ovisst vilket gör att rivning kan starta innan all projektering är klar. Den genomgående synen var dock att alla typer av projekt kan genomföras med CM förutsatt att rätt organisation tillhandahålls samt att projektet är anpassat till CM. Det ansågs extra viktigt att möjliggöra för överlappning och uppdelning av entreprenader i ett tidigt skede i projektet.

Vikten av att ha rätt organisation i ett CM-projekt beskrevs ingående av de intervjuade. Tidigt i processen ska CM-organisationen utformas så att den är anpassad till projektet och till CM som genomförandeform. Att anpassa organisationen kan betyda att förse projektet med den kunskap som behövs såväl som resurser i form av personal, utrustning etc. Vidare tryckte de intervjuade på vikten av att ha en produktionsledare

med rätt kunskaper på plats under byggnationen. Att ha en separat projekteringsledare som håller ihop projekteringen genom projektet nämndes också som en fördel i ett CM-projekt. Det ansågs även viktigt att hela CM-organisationen finns tillgängliga på plats under projektet samt att alla inblandade har goda kunskaper om begreppet CM. I CM-organisationens arbete ingår det att samordna alla sidoentreprenader och gränsdragningar mellan dessa. Hur många entreprenader som ska användas beror på vilken typ av projekt men generellt gäller att rätt antal entreprenader är bättre än många. Ju fler entreprenader som är inblandade desto mer arbete innebär det för CM-organisationen. I projekt med många entreprenader involverade anses det extra viktigt med en tydlig gränsdragningslista över alla entreprenörer. Denna lista bör definiera alla entreprenader och gränserna mellan dem samt kan även ses som ett hjälpmedel för produktionsledaren vid samordning och ansvarsfördelning.

Vilken typ av beställare som är mest lämpligt att genomföra ett CM-projekt på diskuterades också under intervjuerna. En del ansåg att beställaren bör ha tidigare byggkunskaper medan andra ansåg att det kunde vara förstagångsbyggare utan några tidigare erfarenheter. Det blir självfallet lättare för en erfaren beställare att dra nytta av fördelarna med ett CM-projekt med möjligheten att påverka de beslut som ska tas. För en oerfaren beställare kan det vara svårt att avgöra i vissa situationer vilket beslut som är bäst för projektet. Då kan CM-organisationen bistå med sina kunskaper och samtidigt ha beställarens bästa i åtanke. I en total- eller generalentreprenad har inte beställaren samma möjlighet att få samma uppbackning.

Under intervjuerna framkom det att Bygg-Fast och de övriga intervjuade företagen hade olika syn på hur ersättningen till en CM-organisation ska ske. De övriga företagen var alla överens om att ett CM-företag bör erbjuda sina tjänster på löpande räkning där betalningen är timbaserad. Bygg-Fast däremot arbetar med fast arvode. De företag som argumenterade för löpnade räkning hänvisade till de förutsättningar som finns med ett CM-projekt. Då arvodet till företaget är baserat på löpande timmar behöver inte projektet vara preciserat innan arbetet ska starta. Ska däremot fast arvode användas bör det minst finnas riktlinjer i grova drag för att möjliggöra en uträkning för vad CM-organisationen kommer att kosta. Om det sedan görs ändringar i projektet ska detta regleras genom ändrings- och tilläggsrapporter. Vilket betalningssätt som är det bästa får vara osagt. Det viktigaste är att beställaren och organisationen är överens och även om timbetalning används kan riktlinjer om hur samarbetet och åtaganden ska se ut vara fördelaktigt.

Även synen på huruvida incitaments ska användas i ett CM-projekt skilde sig mellan Bygg-Fast och de övriga företagen. De övriga företagen använde sig aldrig eller mycket sällan av incitament då de ansåg att det kunde skapa en motsättning mellan dem och beställaren. Om beställaren ändå insisterade på att använda sig av incitament, lobbade dessa företag för att om möjligt använda mjuka parametrar som mätmedel. På Bygg-Fast finns det också delade meningar om huruvida incitament ska användas. En del anställda refererade likt de övriga företagen till att det kan skapa motsättningar i projektet medan andra ansåg att det ökar prestationsförmågan ytterligare.

Under intervjuerna beskrevs partnering av de intervjuade som de stora entreprenörernas svar på CM. Grundtanken med att samarbeta i projektet mot tydligt uppsatta mål liknar de värderingar som finns i ett CM-projekt. Av de projekt- och produktionsledare som intervjuades hade de allra flesta en bakgrund från entreprenörssidan. De menade att ett partnering-projekt i ett tidigt skede mycket väl kan likna ett CM-projekt. Däremot ansåg de att när budget är satt i ett partnering-projekt skapas motsättningar mellan aktörerna. I ett CM-projekt undviks detta då organisationen ska agera med

beställarens bästa i åtanke. Även sättet ett CM-projekt genomförs på, genom uppdelning av entreprenader, skiljer sig mot ett partnering-projekt. I partnering är det mest typiska att en totalentreprenör går in som en samarbetspartner och därmed har inte beställaren samma möjlighet att påverka projektet.

Sammanfattningsvis uppfattades det under intervjuerna att framtiden för CM ser ljus ut. De flesta som intervjuades och arbetar med CM brinner för genomförandeformen. De kan inte förstå hur en beställare kan välja något annat sätt att genomföra ett projekt på. Därmed blir det extra viktigt för företaget att vara väl insatt i vad begreppet CM innebär och att kunna förmedla detta till sina framtida kunder och beställare.