

# CHALMERS



## Partnering, Lean Construction and BygLOK integrated in construction projects:

– A case study of a construction project in Denmark

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## Abstract

This study discuss which issues NCC Construction Danmark A/S must focus on, thus the philosophy of partnering, the concept of Lean Construction and the Danish collaboration program BygLOK<sup>1</sup> integrated in construction projects will contribute to an efficiency of the company's business. Focus is on leadership among construction managers, working on-site, as well as on obstacles for a successful implementation.

Findings are based on interviews with sixteen construction workers and six construction managers working on an experimental construction project. All interviewees are employed by NCC Construction Danmark A/S. Relevant theory within partnering, Lean Construction, leadership, collaboration and communication is further applied. Information gathered from the interviews is processed and transformed into a set of conclusions which, together with the theoretical research, makes the basic of the conclusions as well as recommendations.

The analysis shows that involvement of construction workers in the planning process in general is beneficial to NCC Construction Danmark A/S. The majority of the construction workers expressed that they feel more motivated and committed in their job as well as take higher responsibility of the task they are performing as a consequence of the involvement in the planning process. Further, the construction managers were in general positive about the integrated project of partnering, Lean Construction and BygLOK. Despite that, a number of the interviewees stated that the information, education and support within partnering, Lean Construction and especially within BygLOK and BygSoL from NCC Construction Danmark's ToP Center are insufficient.

Finally, the results indicate that motivational needs of the construction workers and managers are not necessarily the same. Consequently, the construction managers must adapt a personal behaviour which is situational based as well as focus on NCC Construction Danmark A/S' core business by working structured but not develop new manuals, routines etc. for the construction workers.

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<sup>1</sup> BygLOK is a Danish developed program concerning cooperation and learning in construction projects and is financial supported by the Danish government. The goal is to develop a process which makes the construction workers more involved in and responsible of the planning of their own work. The program was introduced to the Danish construction industry in year 2000.



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A Master thesis within the education programme *Management of the Built environment* at Chalmers University of Technology, Gothenburg, Sweden.

This study has been drawn up in collaboration with NCC Construction Danmark A/S.

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*Martin Baltser Hansen*

Copenhagen, December 2005

## Preface

The objective of this Master thesis is to evaluate which issues NCC Construction Danmark A/S must focus on, thus the philosophy of partnering, the concept of Lean Construction and the Danish collaboration program BygLOK<sup>2</sup> integrated in construction projects will contribute to an efficiency of the company's business. Partnering and Lean Construction are at the time being popular topics of conversation in the construction industry all over the Western world. The two words have almost turned into buzzwords. Further, has two collaboration and learning programs in Denmark been developed. The two programs are named BygLOK and BygSoL respectively, where BygSoL is a successor for the BygLOK program.

Many actors in the construction industry see partnering and Lean Construction as ways to improve the quality, minimise the costs, reduce the time and eliminate defects and accidents. Nevertheless, the concepts are for many people unknown subjects and for other just seen as new words for existing routines and methods.

I got interested in partnering and Lean Construction during my period of studying at University of Greenwich in my spring semester 2003. Since I got back from England, I have tried to do some research on how well partnering and Lean Construction are implemented into the Danish construction industry as well as tried to cover different actor's attitude to the concept of partnering and the philosophy of Lean Construction. Later I was introduced to the two Danish collaboration and learning programs, BygLOK and BygSoL. Of that reason it was obvious to me that my master thesis should be about how partnering, Lean Construction and BygLOK are working together.

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<sup>2</sup> BygLOK is a Danish developed program concerning cooperation and learning in construction projects and is financial supported by the Danish government. The goal is to develop a process which makes the construction workers more involved in and responsible of the planning of their own work. The program was introduced to the Danish construction industry in year 2000.



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# 1 Introduction

## 1.1 Background

The Danish construction industry has in many years been criticised for its ineffectiveness, low quality and high costs. The construction industry has almost been in stagnation, while other industries have improved and specialized year after year. The industry is known for too many mistakes and accidents, and has a reputation as an untrusting industry in the media. The conservative building tradition, the poor drawings and documents from consultants, the tight time schedules and the almost non-existing teamwork etc. make it difficult for actors in the industry to survive and become competitive.

The involved parties in construction projects are too often ending up in arbitration, which for all parties can, and repeatedly is, very expensive, time consuming and a further subversion of mutual respect to one another as well as it reduces the chances for successful collaboration. Through recognition of the existing problems the industry is dealing with, different organisations, governmental officials and scientists etc. have all been researching in how Denmark can improve the badly reputation of the industry. This means to improve the level of quality, minimise the costs and reduce the time spend on projects as well as the number of accidents.

Partnering, where team work, openness and community to costs and profit are in focus is one solution to improve the quality of the work of the industry. It has in some construction projects been seen as a better way of sharing risk between the client, the contractors, the consultants and the suppliers.

Lean Construction and the *lean* thinking is another approach which is mentioned as the solution to raise the level of quality, reduce mistakes and unnecessary work within the construction industry, as the concept focuses on elimination waste and create value for the customer.

Also the BygLOK program has created value to NCC Construction Danmark A/S separately. Consequently, it is interesting to study whether partnering, Lean Construction and BygLOK can be successful integrated in one construction project, which is more beneficial as they are separately.

## 1.2 Problem and purpose

NCC Construction Danmark A/S, (from now mentioned as NCC), is a part in two experimental construction projects running until approximately the middle of 2006. The projects are experimental construction projects of the BygSoL program, which actors of the construction industry together with universities and the government of Denmark have taken the initiative to establish. The project is a further development of the BygLOK project and is partly founded by the European Social Foundation. Its aim is to implement a new construction process where the benefit of partnering, Lean Construction and BygLOK will be integrated into one construction project. NCC is interested in a research of the concept, which analyses future possibilities and pitfalls to the integrated concept. The abbreviation BygSoL stems from the initiative's name in Danish: Samarbejde og L ring I Byggeriet (Elsborg et al., 2004).

The objective of this Master thesis is to study whether the philosophy of partnering, the concept of Lean Construction and the Danish collaboration program BygLOK integrated in construction projects will contribute to an efficiency of the NCC's business. The study will focus on leadership at supervisor and construction manager level within partnering, Lean Construction and BygLOK. Hence the main question has been formulated as:

- Which issues must NCC focus on, thus partnering, Lean Construction and BygLOK integrated in construction projects will contribute to an efficiency of the company's business?

In addition to the main question three sub-questions have been formulated as:

- Which competences and behaviours among construction managers are important, thus an effective integration of partnering, Lean Construction and BygLOK in construction projects is achievable?
- What must construction workers and especially their managers do to reduce the costs as well as improve the quality and the working environment in construction projects by using the elements within partnering, Lean Construction and BygLOK?

- Which obstacles have to be reduced and processes improved, to the benefit of an effective and deeply rooted integration of partnering, Lean Construction and BygLOK in construction projects?

### 1.3 Limitations

This study is drawn up in cooperation with the construction company NCC and the findings may therefore mainly be generalized to NCC. The focus of this study is on leadership within partnering, Lean Construction and BygLOK integrated in construction projects. Focusing on leadership means to analyse construction managers' way of planning, leading and managing construction projects in order to gain the largest benefit from every employee. Leadership is just one issue out of many which is of interest when studying partnering, Lean Construction and BygLOK integrated in construction projects. Other issues are financial growth or reduction, safety, improved quality versus time spend on workshops etc. etc.

The study is based on an experimental construction project where only construction workers and managers working on that specific construction project have been interviewed. All the interviewees have previously worked on "traditional" construction projects. That makes it easier to compare the integration of partnering, Lean Construction and BygLOK with the work and processes in a "traditional" construction project.

The evaluation is not taking cost of workshops, training programs etc. into consideration as well as savings of lawyers etc. because of no traditional form of tender. The evaluation of the concept is made with focus on pitfalls and possibilities for NCC, hence, whether the concept is beneficial to the client, the consultants and the suppliers is not further treated and evaluated.

As the focus in this study is on leadership for middle managers working with partnering, Lean Construction and BygLOK/BygSoL in NCC, no architects, consultants or clients of NCC have been interviewed. Consequently, aspects seen from these parts respective views have not been taken into consideration in the discussion nor the conclusion. Finally, no deeper analysis about whether an integration of partnering, Lean Construction and BygLOK is beneficial to the client or the end users of the building have been made.

## 1.4 Current situation

Like other businesses, the actors of the construction industry strive to reduce costs in order to be more competitive. Reducing costs can be done in different ways, some less successful than others. Within the construction industry most of these initiatives have been made by managers on senior management levels and rarely have these initiatives been created and performed by the involvement of those people the initiatives are created for; the construction workers (Hires et. al., 2004).

Several research studies as well as a number of official reports, such as the “Egan Report” from the Construction Excellence, UK have stated that partnering, Lean Construction and standardisation in construction are the solutions to reduce the costs of the construction companies and improve their effectiveness etc. Consequently, these initiatives have been tested and used in Denmark within the last 5-10 years with higher and lesser satisfaction. Elsborg et. al. (2004) has stated that one of the pitfalls for a more successful implementation of partnering and Lean Construction into the construction industry is the relatively minor involvement of middle managers and construction workers in the implementation process.

The Danish concept named BygLOK, where construction workers are involved in the planning process, has been used on a number of Danish construction sites within the last five years. The BygLOK program has now been replaced by another Danish program. The new program is named BygSoL<sup>3</sup> and is a program where partnering, Lean Construction and BygLOK are integrated. The new initiative BygSoL strives to improve the effectiveness etc. within the construction industry by focussing on the involvement of the construction workers’ competences, experiences and ideas in the planning process, thus the motivation, responsibility and commitment of those will increase to the benefit of the quality, effectiveness, safety etc.

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<sup>3</sup> BygSoL is a Danish experimental project and a successor which has replaced the older program BygLOK. BygSoL is a hotchpotch of partnering, Lean Construction and BygLOK integrated in one project and is partly financial founded by the European Social Foundation.

## **2 Methodology**

### **2.1 Introduction**

In each study there are several choices and decisions to make. First, you need to decide which type of method that is most suitable to your study. This choice has to be based on the problem and purpose of your thesis and research program. Secondly, before you can decide the purpose of your research, you must be able to answer the following questions: What is the problem? Is it a serious problem? Who is it a problem for? Why is it important to solve the problem? What has to be researched? and How has it to be researched?

The purpose and research questions of this thesis are made in cooperation with my supervisors at NCC and are prepared through several meetings in the beginning phase of the process of writing this master thesis. The theories about leadership etc. used in this study are chosen on basis on its relevance to partnering, Lean Construction and BygLOK/BygSoL. The choices of theories are further adapted in according to the outcome from the interviews thus the interview results can be compared with relevant theory within the specific areas.

Within leadership there are many different styles. The styles processed in this thesis are in my opinion closely related to the philosophies, ideas or contents of partnering, Lean Construction and BygLOK respectively. The thesis is structured in a way thus the reader first gets a brief introduction to partnering, Lean Construction and BygLOK followed by different general leadership styles and then finally some more specific leadership styles suitable to partnering, Lean Construction and BygLOK respectively. Further, the theory is adapted and adjusted thus it is relevant to the interview results as well as the interview questions and is adjusted from the first interview session to the second session.

I have chosen to see partnering as a collaboration form and a philosophy, Lean Construction as a concept, which aim is to eliminate waste and BygLOK as a program. The reason for that is that partnering in my opinion is applied within NCC by using a number of already known theories, which are adapted and adjusted into a philosophy where the purpose is to improve the collaboration different parties between by focussing on trust, respect and shared goals, vision and mission. Lean Construction is at the other hand more a concept rather than a philosophy as the cornerstones within

lean production, which is the foundation of Lean Construction, is suitable in different industries. Secondly, the ideas within Lean Production are radically different compared to earlier used ideas and theories within the production and construction industry (Cain, 2004). BygLOK as well as the successor to BygLOK, BygSoL is not a philosophy neither a concept. It is in my opinion a program, primarily because of its small area of distribution, size and contents.

Often are the problems of the research intangible and for that reason is it important to know how to deal with the problem and how to process in order to obtain the necessary information (Remenyi et al., 1998). There are several types of research methods, which all are equally useful depending on the type of study. The method used in this study is as follow.

## **2.2 Qualitative versus Quantities Approach**

The qualitative method focuses on gaining a broad knowledge on subjects rather than facts and figures, which is the objective of the quantitative method. As this study aims to evaluate an ongoing experimental construction project, a case-study, and analyse whether the project is a success or not, the qualitative approach was chosen. The quantitative approach is not that useful for this study because the quantitative method is more formalised than the qualitative method and most useful in studies where statistical methods of measurement are in focus, although the differences between the two types are not that absolute (Holme & Solvang, 1997). Individual interviews were chosen because it is the best way to obtain qualified data of personal opinions etc. Since the nature of the required data includes feelings as well as opinions, individual interviews are a suitable way of obtaining information. A disadvantage with this method is that the data obtained is affected by the interviewer's opinions and attitudes. This might affect the objectivity and quality of the result (Holme & Solvang, 1997 and Remenyi et al., 1998).

## **2.3 Longitudinal versus Cross-sectional Approach**

The empirical data of this study is primarily cross-sectional as the study is an evaluation of an ongoing experimental construction project and the study is conducted during a period of 20 weeks. The cross-sectional approach is opposite to the longitudinal approach, which is more suitable for a long time studying process. By using the cross-sectional approach I study the situation at the

moment and do not take changes in the past into consideration (Remenyi et al., 1998). Nevertheless, the longitudinal approach is also used in some way in this thesis as interviewees are questioned about changes within this construction project compared to other construction projects where they previously have been working.

## **2.4 Empirical versus Theoretical Approach**

In order to create a theoretical frame of references, individual interviews have been made and relevant literature has been studied. Theories from previous studies in Lean Construction, partnering and BygLOK presented in master thesis, journal articles as well as on the internet were covered. By combining the empirical and the theoretical methods it is easier to identify crucial interdependent processes. That is necessary to gain a satisfied progress why, in reality, it is a dialectical relationship between these two aspects (Remenyi et al., 1998).

## **2.5 Adaptation of collected primary and secondary data**

Primary as well as secondary data have been used equally in this thesis. Primary data is data, which is based on personal interviews, case studies or workshops in order to obtain the information necessary to answer the research question of the thesis. Data is primary when its origin is coming from a person, whom the author of the report has been in direct contact with.

Secondary data is based on information, in form of books, articles, reports etc., which are already published by another researcher or scientist etc. Consequently, it is necessary to ensure the validity of the source by comparing it to a similar text written by another author (Remenyi et. al., 1998).

## **2.6 Validity and reliability of data**

To ensure that the literature used in this study has a high standard of reliability, credibility and especially validity mostly more than one source has been used during the theoretical research process. Remenyi et al., (1998) is dividing validity into three different areas; construct-, internal- and external validity. Remenyi et. al. (1998) is mentioning construct validity as:

*“Construct validity refers to establishing correct operational measures for the concepts, ideas and relationships being studied”*

As a result, the authors has to ensure and demonstrate that the idea, the concept, the relationship and the issue of the research is identified as well as demonstrated thus selected measures in the research address the ideas, concept, relationship and issues being studied properly. Articles and books etc. which are written by well-known authors, whose research is commonly used by other researchers, and where the secondary data used by the authors are expected to be reliable, is primarily used in this thesis. The validity as well as the reliability of sources and methods used will automatically affect the creditability of the discussion as well as the conclusion of the study. Accordingly, it is important that the validity of the study is high, thus the conclusion and results of the study are connected to the purpose and problem of the thesis in a proper way.

Internal validity is the degree of a relationship between events or people. Rosenthal & Rosnow (1991) is saying:

*“Internal validity may be defined as the degree of validity of statements made about whether x cause y”*

It is essential that notes of interviews are approved by the interviewees before the statements are used as results in the study. Another pitfall which the researcher has to be aware of is whether the interviewee’s statements to a specific issue are based on his/her individual attitude, based on a single situation or phenomenon or the author’s statement is a general attitude among his/her counterparts.

External validity concerns the judgement of to what extent findings are general or individual. Generalisation from a case-study is only possible to a restricted extend provided that the findings are likely to exist elsewhere then in the specific study. As this study is a study of an experimental construction project it is difficult to meet these demands even though the interview research is compared to earlier research of within the core issues of especially partnering and Lean Construction integrated in one construction project.

*“External validity is concerned with knowing whether the researchers’ findings are generalisable to a wider universe beyond the immediate research environment” (Remenyi et al., 1998).*

### 3 Three types of management

#### 3.1 Partnering

Partnering is a relatively new and different form of collaboration within the construction industry. Partnering has been used in England and USA during the last 10-20 years with mixed success. It is now becoming a more popular method of tender in Denmark. Partnering is a different system or approach of establishing prices. By using partnering, the client, the consultants and the contractors are building to the price the building is worth at the market, instead of building after a redefined price of the building, which is predetermined by calculations (Busk, 2003).

By doing partnering, instead of the traditional phase model, all parties in the construction project are working together as one homogeneous company. In traditional projects the parties are working separately with different interests, targets and opinions. In a partnering project the client, the consultants and the contractor are working together from the very beginning. Together they determine and map out the building program, common objectives, distribution of losses and profit, responsibilities, guidelines etc. (Bennet & Jayes, 1998).

*“Partnering is a management approach used by two or more organisations to achieve specific business objectives by maximising the effectiveness of each participant’s resources. The approach is based on mutual objectives, an agreed method of problem resolution and is an active search for continuous measurable improvements”* (Bennet & Jayes, 1995).

Partnering can be based on a single project (*Project Partnering*) but greater benefits are available, when it is based on a long-term commitment (*Strategic Partnering*). In each instance, the parties desire to work together, in a spirit of cooperation, to maximise efficiencies and profit (Critchlow, 1998). Traditional construction projects can take place in many forms and so can partnering. Partnering can be everything from two small contracting companies having a partnering-ship to several contractors working for and together with the same client. Partnering is in that way not very different from traditional construction projects.

None of the two types of partnering can be pointed out as the best and most suitable way of doing partnering, as partnering in all cases is more about personal values and skills, rather than a type of

agreement. However, reality is that it is a concept, which means different things to different people in different situations and at different times. It is not a term of art, nor does it have one single meaning. Partnering is not only a collaboration tool, but can take place in many different forms. The organisation, the process, the shared goals etc. in a partnering agreement are therefore normally adjusted to the specific project, no matter if it is a project partnering project or a strategic partnering. The reason is that smaller projects do not necessarily need the same kind and extent of organisation, as larger projects can have the advantage of.

Despite these separate objectives, *” the basic philosophy and advantages of single project and long-term partnering are very similar “*(Barlow et al., 1997). Arguably though, strategic partnering makes it easier for companies to focus on broader business objectives, while single project partnering makes it easier to focus on the specific project objectives (Egan, 1998).

Partnering is a quality management process, where the actors try to improve their communication flow in a specific project. By opening communication among the project management personal of the different organisations involved, teams complete the project with greater team spirit. All members of the project work closely together to reach mutual goals and benefits. (Kubal, 1994).

Partnering, as a formal process, began in the early 1980's when the army Corps of engineers, USA, adopted it as a mean of alternative dispute resolution. The Corps' philosophy was that the best dispute resolution is dispute prevention. Not only was partnering successful as an alternative dispute resolution strategy, but the Corps also found that partnering improved project control and safety.

In 1991 the Associated General Contractors of America (AGCA) endorsed the Corps' concept of partnering and began to publish literature and promote the partnering process. Also in 1991, the Arizona Department of Transportation (ADT) became the first state agency to adopt partnering as a strategy for managing construction projects state-wide. The Texas Department of Transportation (TDT) followed Arizona's lead and initiated partnering on 5 pilot projects. Based on the success of these pilot projects, the department expanded the use of partnering state-wide in 1993. Since then, the use of the partnering process has been expanded to include all phases of design and construction. Partnering has proved it so successful in the construction industry that the process has

been adopted in a wide variety of manufacturing and service industries, but also a number of non-successful projects have been discovered. The adoption of partnering was the result of the search for new ways to gain advantage in an increasingly competitive environment, where strategic alliances had failed to succeed. A long term commitment between partners was seen as the solution. The true partnering relationships started in the heavy construction industries in the USA with collaboration between Shell Oil and SIP Engineering in year 1984 ([www.constructingexcellence.org.uk](http://www.constructingexcellence.org.uk))

In all the years partnering has been used, there have been many different suggestions for a definition on what partnering actually is. One of them is really good in explaining it, as it with very few words tells, what partnering is really about.

*“Partnering is an arrangement between a client and his chosen contractors and/or consultants, through which they are seeking more rational forms of association”* (Egan, 1998).

The introduction of partnering into the Danish construction industry was in connection with the construction of the bridge between Denmark and Sweden called “Øresundsprojektet” (Busk, 2003).

### 3.2 Lean Construction

The philosophy of Lean Construction is a further development of the “Toyota Production System” developed in the 1950s. Toyota’s production system was developed because of an increased competition on market share and a dramatically financial reduction. The production system is inspired by Henry Ford’s “Mass production System”. Toyota’s Production System is today known as “Lean Manufacturing” or “Lean Production” because of Womack and Jones’ book *The Machine That Changed the World – the Story of Lean Production* published in 1990. Today, the lean production system is in according to a number of people relatively more effective than many of the European and American car production systems, inclusive Henry Ford’s Mass Production System. The mass production system was recognized as the production system of the 20th and century so are the lean production system of the 21st century (Womack & Jones, 1990).

Lean is about doing more with less; less time, inventory, space, labour, and money. Lean production is, in its most basic form, a systematic elimination of waste, overproduction, waiting, transportation,

inventory, over-processing, defective units and the implementation of the concepts of continuous flow and customer pull. Five issues drive lean production. The five issues are: cost, quality, delivery, safety, and morale (Ohno, 1988).

The first introduction of “Lean Construction” was in year 1992 and was introduced by the Finish scientist Lauri Koskela. Koskela has, by using the principals of lean production, just finished his Report; “*Application of the new production philosophy to construction*” (Kristensen & Nielsen, 2002).

Lean Construction is using the same principles as lean production to reduce waste and increase the productivity and effectiveness in construction work. According to Womach & Jones (2003) there are five fundamental principles, which have to be followed step by step to gain the maximum benefit of the lean production success.

### **3.2.1 The five principles**

There are five key principles within Lean Production (Womach & Jones, 2003). The five principles are:

*Specify Value:* Specify value from the customer’s own definition and needs and identify the value of activities, which generate value to the end product.

*Identify the Value Stream:* Identify the value stream by elimination of everything, which does not generate value to the end product. This means, stop the production when something is going wrong and change it immediately. Processes which have to be avoided are miss production, overproduction (repeat production of same type of product etc.), storage of materials and unnecessary processes, transport of materials, movement of labour workforces and products and finally production of products which does not live up to the wished standard of the customer as well as all kind of unnecessary waiting time.

*Flow:* Ensure that there is a continuously flow in the process and value chain by focusing on the entire supply chain. Focus has to be on the process and not at the end product. However the flow will never get optimal until the customer value is specified and the value stream is identified.

*Pull:* Use pull in the production and construction process instead of push. This means produce exactly what the customer wants to the time the customer wants it to and always be prepared for changes made by the customer. The idea is to reduce unnecessary production and to use the management tool “Just In Time”.

*Perfection:* Aim at the perfect solution and continuous improvements. Deliver a product which lives up to the customer’s needs and expectations and within the agreed time schedule and in a perfect condition without mistakes and defects. The only way to do so is by having a close communication with the customer/client as well as managers and employees between.

Based on the international work of trying to make the construction industry more effective *International Group for Lean Construction – IGLC* was founded in 1993. The purpose of the group was to improve the process as well as products produced in the construction industry through new principles and methods well known from the lean production philosophy (IGLC’s homepage: <http://cic.vtt.fi/lean>).

Later on, in year 1997, Dr. Glenn Ballard and Dr. Gregory A. Howell, both members of the IGLC, founded *The Lean Construction Institute - LCI* in San Francisco. LCI is a non-profit organisation and is researching in methods and tools, which can help construction companies to increase their competitiveness and profitability, thus they can stay successful in business. (LCI’s homepage: <http://www.leanconstruction.org>).

The idea behind the *lean thinking* is to “work smarter - not harder” and is therefore seen as a new and different way of working, which can improve the effectiveness of the construction industry. Most of the previous initiatives to change and improve the effectiveness of the construction industry have often dealt with changing the technical working methods or materials, where Lean Construction has the entire process in focus. Within Lean Construction quality is a very important

element. The standard of processes and quality in all chains must be of highest level, and if it does not fulfil these demands it has to be changed at once.

According to Hans Reich, program director of the Swedish Association between six Swedish universities and IVF<sup>4</sup> Lean Construction is the only way to change the construction industry dramatically, which he believes is necessary. Lean Construction is a new way of working where all individual competences have to be used in the best collective way. That can only happen if managers have the skills to motivate and involve all construction workers on site in the planning of processes and time schedules (Andersson, 2004 – [www.boverket.se](http://www.boverket.se)).

Lean Construction is therefore more a new philosophy of working rather than a management tool. To *Lean* your business does not mean that the company is going to sack all its employees but more that it has to *Lean* the company thus it can be competitive with national and international companies of the same industry.

### 3.3 BygLOK

BygLOK means *Leadership, Organisation and Competence in Construction* and is a Danish experimental construction project where improvement of cooperation, communication and learning between construction workers and managers are in focus.

The overall aim of BygLOK is to develop a process that will make construction workers more involved in the building process and increase their responsibility of daily working routines and decisions, and thus change old-fashioned norms and traditions. It has within the last 5-10 years been obvious for many companies that the skills of every employee are of high value and of great importance for the commercial success of a construction company as well as the employee's own enterprise and his or her own working life (Elsborg et al., 2004). The BygLOK program was set up by partners of several Danish construction Associations, technical schools and training centres, a number of firms from the construction industry as well as Danish University of Education (Dam & Elsborg, 2003).

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<sup>4</sup> An industrial research and development institute

The focus of the BygLOK program is to reorganise the organisation of the construction company thus individual education, culture and time to reflection are of high importance. The learning process of individuals should be initiated bottom up and should be accomplished through establishment of a close interplay between formal and informal learning processes. Even though the BygLOK program was started two years earlier than the European research program report<sup>5</sup> was published, the BygLOK program is using the same ideas as mentioned in the report as the way to improve the lack of growth and productivity in the construction industry (Elsborg et al., 2004).

The well-known researcher Glenn Ballard is probably the kingpin of involvement of construction workers in the planning process because of his theory from “the Last Planner System” which in short is saying that operational construction process plans must be made locally and with a short time horizon. Elsborg et al. (2004) is further saying that:

*“Manufacturing can be seen as a flow, which in general is ordered and under control – a laminar flow – construction must be seen as a turbulent flow, which not all can be controlled in any detail through top-down management”.*

Consequently, the process planning of the construction work on-site must be planned through a local planning undertaken by construction workers and managers altogether. The benefit of involvement of construction workers in the planning process is often underestimated even though the construction workers’ competences may be of great importance for a development of a more effective construction process to the benefit of all actors in the entire construction process.

The six experimental BygLOK construction sites have in general indicated a potential for developing a stronger cooperation between construction workers and managers. Research has furthermore shown that construction workers are collaborating across trades and have more interest and responsibility in their own work as well as they appear more productive and happy in their job function when they get closely involved in the planning. Several construction workers, which have been interviewed about their job satisfaction, have pointed out that their daily work and routines have become more enjoyable and challenging, which have lead to enhancement in their engagement in the project. The enhancement of the construction workers job satisfaction has influenced the

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<sup>5</sup> The CEDEFOP report

companies' earnings, reduced the construction time and improved the quality of work (Elsborg et. al., 2004).

The BygLOK program was a three year development- and research program which was financial supported by the Danish Government and evaluated twice a year. The program was running from 2000 to 2003 and was divided into three steps, which were as follow: (Vindbjerg & Hansen, 2001 – my translation).

1. Fundamental learning through a significant understanding of individual used competences, new leadership strategies and shared values between the cooperating companies.
2. Learning and training in a fictive building activity with involvement of new corporation models and construction processes. (The construction site as a dynamic knowledge- and competence centre).
3. Learning in a laboratory of building activity (with early invitation to tender), while the construction work was proceeding and was supported by a process consultant or even better by a consultant team with different competences.

Examples of methods used in the BygLOK projects are weekly employee meetings, shared facilities for construction workers, interdisciplinary cooperation, high information level and constructive dialogs between all participants in the process (Hellmers et al., 2004). The BygLOK program is now widened into a new *concept* that integrates BygLOK with partnering and Lean Construction. The new concept is named BygSoL and is an initiative focussing on cooperation and learning in construction. More about the BygSoL program later in this thesis.

### 3.4 Comparison of partnering, Lean Construction and BygLOK

The purpose of partnering, Lean Construction and BygLOK are the same, as the shared goals are to improve a company's turnover, productivity and quality, as well as the design of the building. Hence, there is a potential that partnering, Lean Construction and BygLOK fit well to each other. However, it does not mean that partnering and Lean Construction are the same, but the overall ideas behind the philosophy of partnering and the concept of Lean Construction are quite similar. The

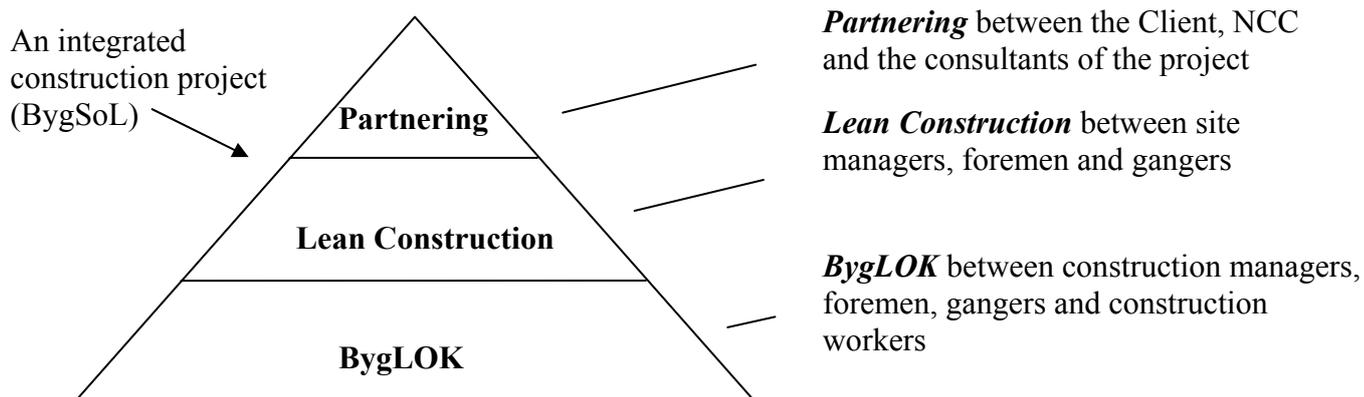
largest difference between partnering, Lean Construction and BygLOK is the organisational level and job function of the people, which in everyday life is working with it.

*Partnering* is primarily between the client, the consultants and the general contractor and in some cases also his sub-contractors and larger suppliers. The partnering process does therefore normally not involve as many persons as in the Lean Construction and BygLOK work. The persons involved are often top managers representing the different actors of a construction project. They set up the rules, the target price and deadlines for the project, but they do not take part in the actual work on the project in every day life.

*Lean Construction* is also primarily between managers, but managers on mid-size level, which means the general construction company's construction managers, supervisors and gangers and his sub-contractors. The sub-contractors' suppliers can also be a part of the Lean Construction. Finally, the foundation of Lean Construction is to eliminate waste.

*BygLOK* is on the contrary collaboration between both the construction workers in between and the construction workers and their managers working on site. In this manner knowledge, opinions and experiences among construction workers are used in a constructive way. Because a lot of persons are involved in the cooperation, BygLOK sets high expectations to both the construction workers and the construction managers to get the best possible results out of the concept. On the other hand the BygLOK collaboration a new way of working for most people within the construction industry. The concept also focuses on trust, communication etc. Finally, the program is based on peoples basic and naturally needs, job satisfaction and personally well-being.

Figure 1 shows an integrated construction project consisting of partnering, Lean Construction and BygLOK. The shape of the figure is a triangle and symbolises few but highly placed persons in the hierarchy involved in the partnering process, more and primarily middle managers and foremen involved in the on-site Lean Construction work and all the construction workers and the construction managers working on-site involved in the BygLOK program.



**Figure 1.** An integrated construction project consisting of partnering, Lean Construction and BygLOK.

**Similarities:** Improvement of quality, safety and reduction of construction- time and costs.

**Differences:** Different parties from different organisational levels.

The integrated concept will not work without involving the construction workers in the planning process. It is important that the construction workers are motivated, committed and satisfied with the project and their daily work, if the project must be successful. Otherwise, the construction workers will feel that the concept is a waste of time and that they spend unnecessary time on meetings, workshops etc. without getting the feeling of being a part of the project. More about what construction managers and NCC's Top-Center<sup>6</sup> have to do to obtain the largest benefit of an integrated construction project of partnering, Lean Construction and BygLOK later in this thesis.

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<sup>6</sup> The abbreviation of NCC's ToP-Center stems from *Time and Planning department*

## 4 Leadership theories

### 4.1 Different types of leadership

In this chapter I will firstly concentrate me on five different leadership styles. The chosen leadership styles are all well-known and fairly used within a number of industries. In my opinion they are all relevant in the context of the elements within partnering, Lean Construction and BygLOK/BygSoL. The majority of the chosen leadership styles are focussing on competences and behaviours among primarily managers as well as how to lead subordinates by performing leadership in different ways for different situations. Secondly, I will describe how NCC in Denmark is working with leadership and how they are informing and educating their employees within their values, mission and strategic goals etc. Thirdly, I will finish this chapter by looking deeper into different leadership styles contained by partnering, Lean Construction and BygLOK respectively and how leadership has to be performed in the best way within these three management styles.

Leadership and different types of leadership are topics which there have been written books and papers about for many decades. There are many ways of looking at leadership and even more interpretations of its meaning. Leadership might be interpreted in simple terms as the way to “getting others to follow you” or to get people (employees or subordinates) to do things willingly.

Leading can also be more autocratic by the manager using his/her authority and power in his leadership style. In that way the leader is more a manager than a leader. An essential part of management is to co-ordinate the activities of people and guides their efforts towards the goals and objectives as well as vision and mission of the company. This involves the process of successful leadership and an appropriate form of personal behaviour by leaders and managers. A personal leadership style is in this manner a central feature of organisational performance. The manager must understand the nature of leadership and the factors which determine the effectiveness of the leadership (Mullins, 2002; Holt, 1998). The difference between managing and leading is relatively simple. The word managing is close connected to the word *control*, where leading is more about coaching, informing and motivating employees. Leadership might be based on a function of personality, where managing is a function of a specific job function within an organisation or company (Grint, 1997).

#### 4.1.1 Transactional versus transformational leadership

One of the probably most used types of leadership has for a numbers of years been the transactional type. Today are most managers use a transformational type of leadership (Özaralli, 2002), but what is the different and when is the transformational leadership style adaptable and when is it to prefer? The differences between the two types of leadership style are not always unambiguous.

The transactional leadership style emphasizes the clarification of goals, working standards, and task assignments and focuses on task completion with compliance based on incentives and rewards and appeal to the self-interest of the subordinates (Bass, 1985). This type of leadership is fairly usable for the managers within the production and construction industry as the education level between construction and production managers and their subordinates often are relatively different. Nevertheless, the transformational leadership style is becoming more and more used by managers, not just by managers outside the production- and construction industry, but also by managers within these two industries. The transformational leadership style is in contrast characterised as a leadership style where managers, and not managers, motivate subordinates by appealing to higher ideals and moral values (Hinkin & Tracey, 1999).

Yukl (1989) defined transformational leadership as *“the process of influencing major changes in the attitudes and assumptions of organisation members and building commitment for the organisation’s mission or objectives”*.

Bass & Avolio (1994) stated that transformational leadership is composed of four dimensions, which they described as the “Four Is”. The “Four Is” are; *Idealized influence* (charisma), which is based on employees respect and admiration for the manager, *Individualized consideration*, the extent to which the manager cares about the employees concerns and development needs, *Intellectual stimulation*, the degree to which the manager provides employees with interesting and challenging tasks and encourages them to solve problems in their own way and *Inspirational motivation* which is based on communication of expectations and employees confidence in the managers vision and values.

Rouche et. al. (1989), Hater and Bass (1988) and Yammarino and Dubinsky (1994) have argued that transformational leadership involves employees having a strong personal identification with the

manager, a shared vision for the future and working collectively for the benefit of the group. Yukl & Van Fleet (1992) is stating that transformational leadership display intellectual stimulation when the manager helps the subordinates develop new ideas motivates them to take alternative routes to problem solving and take a closer look at all possible solution. They further state that individualised consideration occurs when managers pay individual attention to their subordinates and provide support and act as a mentor. By changing or removing the conditions that lead to feelings of powerlessness, it is expected that employees would perform at their productive and creative best. Managers with transformational behaviours energize and hence empower their subordinates to act by providing an existing vision for the future rather than managing them through rewards and punishment (Özaralli, 2002; Kelloway et al., 2002). The transformational manager is by several researchers mentioned as a more effective manager than the transactional manager even though he or she is leading by letting the subordinates take decisions by them self (Vecchio, 1997).

Despite the modern philosophy behind the transformational leadership style it is not always the most practicable leadership. For instance are goal setting, standards, routines and structures important working methods within the construction industry. In addition, it is not always that easy to work as a coach or a mentor in the construction industry, when you yourself are not educated as a construction worker, but educated as a technician, e.g. an engineer or simply because some construction workers are not interested in having responsibility etc.

The transformational leadership style has also been criticized for other weaknesses. It is the manager or the organisation it self which set the mission and vision of the organisation. In that way the subordinates are not stimulating their own needs etc., which is one of the theories behind the transformational leadership style. Another critic of the transformational leadership style is that it is based and constructed from interviews with senior corporate managers at high hierarchical organisational levels and not based on interviews of mid-level managers, supervisors, foremen etc. Consequently it is difficult to decide whether the theory is practicable for managers and managers at all levels within the organisation (Northouse, 2001). The theory has further been criticized by Bryman (1992) and Tracey and Hinkin (1998) as difficult to clearly define the parameters of transformational leadership. The parameters are often overlapping with other similarly concepts and theories of leadership such as clarifying, inspiring, supporting and team building. For that reason I will focus on primarily those issues as they all are closely connected to the theories behind

partnering, Lean Construction and especially the two Danish corporation programs BygLOK and BygSol.

#### **4.1.2 Autocratic, democratic or laissez-faire leadership**

Johnson & Johnson (2003) claims that a manager must be a person who can influence people in a positive direction, thus they are able to become effective in what concerns working relationships but also regarding achievement of mutual goals. They also state on the basis of an old theory from 1939 by Lewin et. al. that there are three main leadership styles. The first leadership style is what they call the autocratic leadership style, which is where the manager dictates and decides all working routines and job functions, without listening or using the subordinates' knowledge, experiences or ideas. The second style is described as the democratic leadership style. Here is discussions hold among employees and managers and subordinates are encouraged to participate in stating their opinion. The last approach is the laissez-faire leadership style. This leadership style is taking a more laid back attitude toward decision making in the organisation and lets the employees taking most decisions themselves.

Lewin et. al. (1939) argues that people are more dependent on their manager and his or her judgment and skills and more egocentric in their peer relationships if they have a manager approaching an autocratic leadership style. In addition, people react more initiatives, friendly and responsibly, when the manager is using democratic leadership behaviours. Hence, Lewin et. al. (1939) concluded that the democratic manager, who is motivating the subordinates to do their best without controlling and managing them, is more beneficial when it comes to the output of the workforce compared to the output of subordinates managed by an autocratic manager. Also the quality in the work is argued by the same authors to be of higher quality and that is despite the fact that the manager is approaching a more non aggressive act. For that reason most people prefer to have a manager using a democratic leadership style rather than an autocratic or laissez-faire leadership style. Vugt et. al. (2003) states that an open and democratic manager, who actively involves group members in the decision-making process, may be more likely to retain and rebuilt a closer relationship than autocratic managers will.

Despite the research made by Lewin et. al. (1939) and Vugt et. al. (2003) it is hard to give an unequivocal answer to which of the three leadership styles that is the most adaptable and

unambiguous best. The reason is that different styles are effective under different circumstances (Liu et. al, 2003). The autocratic leadership style is for instance to prefer in situations where an urgent decision has to be made or to solve group conflicts (Messick & Brewer, 1983), where the democratic leadership style is better in situations where new ideas etc. has to be implemented as employees appreciate managers who listen to their arguments and ideas. The laissez-faire leadership style is only useful when it comes to situations where everybody has the same entrance angle, and opinions (Vugt et. al., 2003).

#### **4.1.3 Leading by using power**

Managers have power when they are able to affect subordinates and colleagues' beliefs, attitudes and courses of action. Leading and managing other people by using power is an often used way of managing subordinates. Whether the management or leading of other people is executed because of physical, organisational position or personal power or because of your skills, experience or knowledge, this way of leading can be useful for a shorter or longer period. A way of gaining power is the power a manager can achieve by his subordinates. Some managers and managers, and even persons who are not managers, can for that reason have a high level of informal power because their subordinates or colleagues find them to be role models or because they are viewed as highly competent (Northouse, 2001; Mullins, 2002).

Probably the most well-known study of social power was made by French and Raven (1959). They identified five types of power, which they named social power; reward, coercive, legitimate, and expert and referent power. Reward power is based on the employee's perception that the manager has the ability and resources to give rewards to those who comply with directives. Coercive power is in the other way based on fear and the perception that the manager has the ability to punish those employees who do not comply with the managers directives. Legitimate power is based on the perception that the manager has a right to exercise influence because of the manager's role or position in the organisation. Coercive and legitimate power is only based on the manager's position and not his or her personal charisma, skills or experience. This type of power is according to Mossholder et. al., 1998 only effective during a short period and not all subordinates will let them be lead by such a manager. Referent and expert power is on the other hand the type of power which subordinates prefer their manager to approach. These two types of power are based on the values of the manager him or herself. Referent power is where the subordinates can identify themselves with

the manager and the manager exercises influence because of perceived attractiveness, personality or the reputation among the subordinates. The last type of power is according to French and Raven (1959) what they call for expert power. This type of power is not necessary executed because of the manager's charisma but mainly because of the knowledge, skills and education level (Mullins, 2002; Mossholder et. al., 1998).

Several researchers, among these Greenberg, (1990); Keys and Case, (1990) and Hollander and Offermann, (1990) claimed in their research that the managers' personal communication skills, attitude and qualifications as well as his or her trustfulness and justice are at least as important as his or her organisational position. The managers' ability to influence subordinates depends partly on factors that are subjective in nature. To be fair and trustful, managers must be concerned about appearance of fairness, and a willingness to consider the subordinates' views and be even-handed in decision making. In this regard, Keys and Case (1990) suggest that skills-based power reflecting qualities associated with referent and expert power is crucial skills for managers who want to sustain influence and be an effective manager, especially when it comes to teamwork and workforce diversity. For that reason, trust, mutual respect and co-operation among managers and subordinates become important consideration in connection with social power as well.

Mossholder et. al. (1998), pp. 549 says: *"Through the quality of supervisor-subordinate exchanges vary, in most organisational context subordinates expect to be treated politely and have respect shown for their rights as employees and as individuals"*

#### **4.1.4 Leading by goal setting and motivation**

According to Evans (1970); House (1971) and Johnson & Johnson (2003) the goal theory is about how managers motivate their subordinates to accomplish designated goals. They all states this leadership theory enhance employee performance and employee satisfaction by focusing on employee motivation. The goal theory emphasizes the relationship between the manager's leadership style and the characteristics of the subordinates and the work setting. This theory focuses on how to transfer the personal motivational needs and goals of the subordinates into one shared organisational or project goal. Leadership motivates when it makes the path to the goal clear and easy to obtain through effective coaching and guiding by the manager. The manager has in corporation with the subordinators to remove obstacles on the path to the goal in order to attain the

goal in the smoothest way. When the path in a project is clear it makes the work itself more personally satisfying for all involved in the project.

If subordinates do not know where, why and how to get to the goal, they automatically start sub-optimising to their own benefit (Emsley, 2003). Consequently, it is important that the organisation has a clear vision, as the vision clarifies the mission and goals of the projects and groups. The vision shows the employees what is possible, if everyone within the organisation works for the same shared goals. A useful goal has to be clear, tangible and obtainable and everyone within the specific project or group has to be and take part in the goal setting phase.

Some of the symptoms of unclear, intangible and unobtainable goals are a high level of group tension, distraction by side issues, sub-optimising by individuals and the failure to find and execute good ideas. The importance of clear vision, mission and especially goals may often first be seen when groups lose their direction. When it happens, it is easy to go back to the predetermined goals and deadlines, which all within the project can be held responsible for as they themselves have participated in the goal setting process (Johnson & Johnson, 2003; Robertson, 1994; House & Mitchell, 1974).

Individuals or groups with specific quantitative goals, such as a defined level of performance, or a given deadline for completion of a task, will perform better than individuals or groups with no set or vague goals. Further, individuals or groups who have challenging and difficult goals will perform better than individuals or groups with easier goals (Locke, 1975). Locke (1975) states that goal setting provides a useful approach to improvements of work motivation and performance as long as the management as well as the subordinates are participating in the goal setting. Hence, the management is acting as a front figure or role model in the daily work situations and the employees have understood and agreed on the goals set. Managers must be present in the daily project work and be communicative with feedback to subordinates about deadlines, time and task planning and knowledge, which can be of interest to subordinates and co-operators.

Individuals as well as groups perform better when it comes to goals of high complexity compared to goals of lesser complexity. That is the same when it comes to the level of education, skills, information and experience to a specific task or work situation, in connection to goal-setting. Goal

setting affects poorer performers more, because they need the role clarification it provides, to a greater extent than better performers. Goal setting can also have a weaker impact on attitudes of better and more task informed performers e.g. mid-level managers as they often have their own goals confirmed in the process than will poor performers and lesser task-informed and task-educated performers (Orpen, 1995). Robertson (1994) confirms Oregan's theory by arguing that goal setting has a higher impact on subordinates rather than on mid-level managers as the mid-level managers' individual goals primarily are closely connected to the object goals of the project. Finally, different people have to be motivated in different ways and especially employees within an organisation with different tasks and education levels have different needs, goals and ambitions within their job (Mullins, 2003).

According to House and Mitchell (1974) and House (1996) different leadership behaviours could have been selected to be a part of the "path-goal" theory. The explanation is that the theory can be adopted in many different ways, just as situational-based leadership style can. More about the situational leadership style later in this section. As I find House's four different leadership behaviours; *Directive-*, *Supportive-*, *Participate-* and *Achievement-oriented leadership* relevant for the thesis, I have chosen to write shortly about them under the path-goal leadership theory.

*Directive leadership* is according to House (1996) in some way close connected to the theory of situational-based leadership although the directive leadership approach is task-orientated and autocratic. A directive manager is characterised as a manager who gives the subordinates instructions about their tasks and what is expected of them when it comes to quality, deadlines and working methods. This type of leadership is connected to clear standards of performance and makes rules and regulations clear for the subordinates.

*Supportive leadership* refers to being friendly and approachable as a manager and attending the wellbeing and personal needs and wishes, which motivate the subordinates. The supportive manager has to treat the subordinates as equals and give them respect for their own status as well as try to decode the individuals' needs and motivation factors by mutual communication and corporation.

*Participative leadership* is the type of leadership where the manager invites the subordinates to take part in the decision making process. The manager's use in a constructive way subordinate's

knowledge, experience and skills in order to acquire the best solutions to a problem. The manager is by integrating the subordinates into the decision making process motivating the subordinates to take higher responsibility for their own work and motivating them to do their best, as they themselves have contributed with ideas and solutions on how the group will proceed and perform.

*Achievement-oriented leadership* is characterised by a manager who challenges the subordinates by giving them tasks to perform of as high complexity as possible and always seeks continuous improvements. The achievement-oriented manager shows a high degree of confidence thus subordinates are capable of establishing and accomplishing challenging goals.

None of these four types of leadership styles are proved or can be set to be the best for all situations, tasks or job-functions. The manager may exhibit any, or maybe various at the same time, of the four styles of leadership behaviours. One of the styles can be motivational in one situation and for a particular subordinate and another can be it in another situation and to another subordinate. For instance, the theory suggests that managers should be directive when the tasks are complex and on the contrary be supportive when the tasks are dull. Similarly, the theory says that managers must be participative when subordinates need control and finally managers must be achievement-oriented when subordinates have needs to excel. Consequently, the manager must choose a leadership style that best fits the needs of the subordinates and the work they are doing.

A criticism of the theory is that the theory is fairly complex and perhaps difficult to implement in real life situations. The theory is containing parts of many other leadership theories and is for that reason also reasonably wide. I have therefore chosen to write about situational-based leadership, because this type of leadership is closely connected to the goal-path theory, and is in that way further explaining the overall theory about motivation and coaching. As the name of the style implies, a situational leadership style focuses on different leadership approaches for different situations.

#### **4.1.5 Situational based leadership**

Different situations may call for different types of leadership. That is the theory by Hensey and Blanchard from the late 1960's. The theory has however been modified several times since its

inception by for instance Johnson and Johnson, 2003; Mullins, 2002; Northouse, 2001 and Vecchio, 1997.

Situational leadership does not only require different kinds of leadership, it also demands different managers for different job situations. Some managers are born with directive leadership skills where others are born with supportive leadership skills and even some can manage both. Situational leadership stresses that leadership is composed of both directive and supportive leadership dimensions and each of them has to be different in different situations. The manager must for that reason evaluate the subordinates and evaluate how competent and committed they are to perform a given task in a given situation. An effective manager is therefore a manager who can recognize what the subordinates need and then adapt their own style to meet those needs (Blanchard et. al., 1993; Avery, 2002).

A second part of the theory of situational leadership is focusing on the development, the competences and the commitment level of the subordinates necessary to accomplish a given task or activity. The manager must diagnose what can be expected by the subordinates as well as diagnose the task the subordinates are going to perform. Are they well prepared, skilled and motivated and which pitfalls can arise during the process (Vecchio, 1997; Blanchard et. al., 1993; Boatwright, 2002). Because of these factors it is difficult to give a clear suggestion to one leadership approach rather than another.

Finally, situational based leadership is about treating each subordinates differently based on the task and seek opportunities to help the subordinates to learn new skills and become confident in their work. Some employees are from the beginning very skilled, effective and experienced and therefore they are creating value for the company where others do only create costs. As a result of that, it is the manager's responsibility that the subordinates who do not create value for the company or the project are supported, trained and guided to do so. Motivation is different from person to person, but creation of value should not be significant different from person to person.

#### **4.1.6 Team leadership**

The last type of leadership, which I have chosen to focus on, is team leadership. I find this leadership style relevant, because construction workers as well as construction managers most of

their time are working in teams. Simultaneously team work and leadership of groups and teams have become one of the most popular areas of leadership theory and research (Johnson and Johnson, 2003). Team work is in some way a part of other leadership theories e.g. leading by goal setting, supportive leadership and democratic leadership. The explanation is that team members share common goals, and have to coordinate their work with each other in order to obtain the best result. Examples of teams both within and outside the construction industry are project management teams, working teams, interdisciplinary teams and self-managed teams.

Within the rapidly changing environment, the use of team-work has been found to lead to greater productivity, more effectively use of resources, better decision making and problem solving, higher quality in work, improvement of processes as well as increased innovation, creativity, motivation, commitment and job satisfaction among employees working in teams (Parker, 1990). More and more organisations have for that reason changed the company's decision-making downward from the traditional hierarchy to more self-managed teams and empowered them in new ways. Having more employees with increased empowerment will in the long term increase the company's turnover and reduce costs, numbers of mid-level managers, meetings etc.

One of the main ideas behind the theory is to let the employees feel that they are a part of the company and as important as the senior managers of the company are. There has to be mutual respect and harmonious and positive relationships among all employees and between managers and their employees, thus empowerment can be created on all levels within the organisation. Managers have to involve the subordinates in the decision making or let them be self-managing teams if they want to take advantage of the knowledge of their subordinates in the best way (Vroom, 2003). They also need to learn to analyse and balance the internal and external demands of the teams and react appropriately by changing or remaining consistent. The manager can identify, analyse or forecast problems, which means monitoring the teams, or the manager can take action by solving problems observed. The manager may decide whether he or she has to focus on problems within the group, which means internal problems or he or she has to focus on external problems, which means problems outside the group, but which can influence the work of the group (Hackman and Walton, 1986).

In addition to being functional and appropriate, team managers also needs to be practical and focus on the outcome of the teamwork as well as be concerned about practical needs of the team. Managers of teams or managers who are supporting self-managed teams must have a clear focus on the outcome, goals, structure and functionality of the team. Hackman and Walton (1986) have suggested some components necessary for effective task-performing teams:

1. Clear, engaging direction
2. An enabling performance situation
  - A group structure that fosters component task work
  - An organisational context that supports and reinforces excellence
  - Available, expert coaching and process assistance
3. Adequate material resources

To obtain these components, the manager needs to coach, build commitment, trust and a solid network with the subordinates and colleagues inside as well as outside the organisation/project. The manager therefore needs a wide repertoire of communication skills to monitor and take appropriately action when that is necessary for the team. Finally, it is the manager, who sets standards, makes decisions and clarifies goals of the team as well as ensure and maintain the collaboration within the team as well as avoid and effectively resolve personal conflicts of the team before they escalate unnecessary in scale (Northouse, 2001; Vroom, 2003).

#### **4.1.7 Comparison of the different leadership styles**

The transformational manager is relatively using the same tools and philosophy as the democratic manager and opposite is the transactional manager using some of the approaches, which the autocratic manager is using. The transactional leadership style emphasizes the clarification of goals, working standards, and task assignments where the transformational manager is emphasizing on motivating the subordinates by appealing to higher ideals and moral values.

Autocratic, democratic and laissez-faire leadership styles are focusing on the manager's personality and how the manager has to react in different situations in order to obtain the best result of the subordinates. The autocratic style is often seemed as old, dictatorial and ineffective and the laissez-faire style as autonomous, difficult to apply as well as ineffective. However, both of them can be

beneficial in some situations. In addition to these two leadership styles is the democratic style much more a topic of conversation for the majority of managers and researchers (Vugt et. al., 2003).

In the democratic leadership style are discussions held among the employees and the managers and the subordinates are encouraged to participate in stating their opinions. This type of leadership has for that reason been understood as modern, more effective and typical within the last two decades (Johnson and Johnson, 2003).

Another way of leading subordinates is by having formal or informal power. Managers have power when they are able to affect subordinates' beliefs, attitudes and courses of action. The power of the manager can be based on skills, organisational position, charisma, age, sex, experience etc. Leading by formal power can be effective but it can also prevent innovation, creativity and the subordinates' motivation to commit in decision making. Informal power is when subordinates find their own natural manager, who is not officially appointed as manager.

Leading by motivating, setting up goals and using self-managed teams are another way of leading or coaching subordinates. These types of leaderships are almost a function of several other leadership styles such as the democratic, the transformational and the situational based type of leadership. Hence, it is difficult to choose one type of leadership style to be more effective than another. Different situations, people and tasks call for different leadership styles and different managers have different personalities. Some managers fit best to one type of leadership and others to another. Leading other people is not something that can be done by using an international standard. It has to be learned by time and adjusted over time.

## **4.2 Leadership within NCC Construction Danmark A/S**

NCC is one of the leading construction companies in Denmark. The company is among other things, and as a result of its size, primarily competing about larger customers. Larger customers are getting more and more engrossed when it comes to environmental issues, safety conditions, quality and time control as well as the construction costs and the company's ability to minimise cost overruns. The demands of the customers do also set high demands to NCC's employees. Consequently, it is important that NCC in an effectively way can comply with the customers'

demands by having the right number of homogenous employees, both when it comes to construction workers as well as managers.

NCC's mission is "*to collaborate with customers, partners and suppliers to the effect that satisfy people's needs for quality in buildings*" and its vision is "*to be the construction company which from the earliest phases of the building process give the customer and its partners consulting in how to create largest possible value in a project*". (NCC Danmark's forretningsmodel, 2005 – my translation)

NCC's way to obey the vision, which is the strategy of the mission, is through its predetermined values and goals. Their values are: honesty, trust, respect, focus, detail and responsibility. It is those values that NCC wants their employees to follow and live up to. The values are made as a guideline and trade sign for the company's customers and its employees. The mission, the vision as well as NCC's values are a part of an overall "business concept". As an explanation and a more concrete business plan NCC has set up its own daily work goals as well as five strategic goals. The goals for the company's daily work are; satisfied customers, products of high quality, large revenue and job satisfaction and the strategic goals are; *Employees* - "to attract, develop and to keep the industry's most competent employees", *Partnering* – "to have partnering as primary collaboration form", *Productivity* – "to increase the productivity in the building process through coordinated purchasing, and process improvements", *Quality* – "to be recognized by customers and collaboration partners as the construction company which have the highest possible quality in products and services" and *Growth* – "to obtain profitable growth" (NCC Danmarks forretningsmodel, 2005).

NCC's mission, vision, values and goals are all a part of the company's "business model", which is set and made by the management of the company. It is the business model which shows the overall characteristics of NCC and how it works.

#### **4.2.1 How does NCC inform and educate its employees about their business model?**

Job interviews and appraisal interviews are the most directly form of communication that NCC is having with each employee. New employees have several conversations with the person who is going to be the new employee's manager as well as the staff from the human resource department. At those conversations NCC inform the new employee about the company's vision, values and

goals thus the new employee knows what the company expect from him or her and what he or she can expect of NCC. In addition to these introduction conversations and job interviews all employees of the company have at least one yearly conversation (appraisal interview) with their personal manger. The purpose of the appraisal interview is to discuss the employee's job situation and future job function, salary etc. in the company. Those conversations are of course more personal emphasised (Før mødet med NCC i Danmark, 2003).

Seminaries, courses and training are other methods, which NCC uses to inform and train their employees in new concepts, strategies or goals. These methods are more general and the purpose is to give groups of employees the same information at the same time. It is necessary that NCC's employees are conscious about the company's strategy, vision and goals thus all employees within the company are working to reach the same goals.

The third way of communication is through the internet, the intranet, brochures, advertisements etc. This type of communication is more indirectly than the two others, but effectively as it easily reaches many people in a fast way. NCC makes further annual brochures for both their employees as well as their customers. The brochures are informing customers about new concepts as for instance partnering and NCC's vision, mission, goals and strategy and the internal brochures inform the employees about the same things but more as an education tool (Før mødet med NCC i Danmark, 2003; Medspillere – NCC's erfaringer med partnering, 2003; Den menneskelige factor, 2002 and [www.ncc.dk](http://www.ncc.dk)).

### **4.3 Leadership within partnering**

Partnering is seen by the majority of the actors and people of the construction industry as a new way of collaboration. Partnering is for many people a new way to collaborate and do business with other parties and for others it is just "new wine in old bottles". Partnering is an overused term and has almost become a buzzword, so is leadership. But when connected together, the meanings of these two words change, and it becomes more likely that there are many interpretations and applications of partnering as well as leadership (Segil et. al., 2003).

### 4.3.1 Implementing partnering

To obtain the largest possible benefit of partnering, managers at all organisational levels must be concerned about how they are communicating the concept of partnering. Managers can easily fail to set out clear goals for the changing process, when the organisation is shifting to use partnering as their preferred collaboration and leading form. According to Cain (2004) managers are often failing to ensure that everyone within the entire organisation, project or group is clear about what they should be doing differently, are failing to explain the commercial logic behind the new working practice and are failing to demonstrate by their own words and actions their commitment to the new way of working, as well as the opportunities, and advantages of how partnering positively can influence the individual within for instance a construction project.

Cain (2004) is further saying “...managers are very good at talking the talk and using the right buzzwords like partnering, supply chain management, lean thinking and supply chain integration, but they are not very good when it comes to practising what they preach”.

Evidence shows, that it is rare if as many as 30% of the workforce are in favour of the changes where the changes affect their own working routines. Another 30% will fight against the changes as they are afraid that the changes will influence their working routines in a negative way as well as their status, ability to perform or payment (Mullins, 2002). Managers can not expect employees to embrace radical changes unless they have been given their employees proper training in the new working practice. Important factors to a successful implementation of the partnering concept are therefore necessary education, training and communication by their managers. Hence, managers must develop and facilitate the achievement of the mission, the vision and the goal of the implementation process. They must also be personally involved and ensure that the organisation's or project's management system is fully developed, implemented and deeply rooted in everyone working within the project. The manager must communicate in a language each employee understands thus he or she ensures that everyone is taking part in the changing and implementing process. The process provides the employees with a route map that enables each of them to modify or change their outmoded working practices.

As long as the employees can see or sense real and tangible improvements in the outcome of their work based on the new working practices they will automatically be motivated to continue to do

things in the new way. Consequently, it is important that the manager shows and explains success stories thus the employees can feel and see the benefit of doing partnering compared to working in a traditional form (Mosley et. al., 1993).

#### **4.3.2 Building mutual trust**

The heart of collaboration is trust. It is the central issue in human relationship within an organisation or a project. One of the cornerstones in partnering is not to rely on contracts but rather on mutual trust to one another and each party has to belief in the integrity of the collaborators. Managers within partnering have to create an environment, where everyone is working for the same goals and feel that they are on the same team. Nobody must feel that they are loosing at the expense of someone who is winning. Building trust is however the hardest part of creating a durable partnership as it usually only emerges from an accumulation of shared experiences and from a gradual deepening of mutual understanding. Trust can also break down as a consequence of high turnover of employees as the existing team in that way loses a piece in the puzzle.

Building trust often involves multiple processes. The interdependence of those involved in the relationship has to be recognised by all. The success of each party is depending on the success of the relationship as a whole. Short-term gains from taking advantage of another party are outweighed by the benefits of the improvements of the overall performance. This implies that employees as well as managers have to recognise that they need to share information and possibly accept diminished control over their activities and processes (Kubal, 1994; Barlow et. al. 1997). Managers need to build personal relationships as well as win-win situations, not just managers between but also between the manager and his or her subordinates. It is important that all involved actors in a partnering project feel that they are doing a difference, thus they feel they are a necessary player on the team. Some managers have from nature such skills while others have to build them.

Ensuring better interpersonal relationships involves both encouraging personal friendship as well as having the right employees, both subordinates and managers, at the team to do a specific task. Such personal skills are especially important in construction projects where managers and subordinates often only work together for a shorter period of time as they, when one project is done are separately moving on to different construction projects. This fact sets high demands to construction

managers and for that reason not all construction managers are suitable for partnering projects (Kubal, 1994).

#### **4.3.3 Communication, interdisciplinary dialog and job satisfaction**

Managers at all levels, and especially managers, who are in daily and close contact with their subordinates need to develop skills, which make them able to negotiate and build “win-win” relationships with their subordinates as well as colleagues and external collaborators. Managers who traditionally have been rewarded for winning competitions with own colleagues, need to change style thus they start collaborate and share with colleagues in the organisation or project instead of compete with them (Segil et. al., 2003).

The success of a larger organisation depends on the individual manager’s ability to become a great partner with the subordinates and colleagues. Interdisciplinary dialog and understandable communication between managers and subordinates, as well as managers between, is one of the cornerstones of effective partnerships and leadership in general. According to Segil et. al. (2003) developing internal partnerships with subordinates and colleagues can often be an even greater challenge for managers than developing partnerships with external collaborators. Other researchers such as Cain (2004) are arguing that managers who are in directly contact with their subordinates are also the managers who are in possession of important knowledge and information about how to change a process compared to higher placed managers in the organisation. Because of that, it is necessary, that the frontline managers are in possession of skills which enable them to build and retain good partnerships with subordinates. Managers working in partnering projects must focus on both technical as well as non-technical issues. By being communicative and share information such as the vision, mission and goals of the organisation as well as the outcome from daily discussions managers between, subordinates tends to get more motivated to strive for the goals of a construction project. Such behaviour by the managers will by time turn the subordinates to be more active in their daily work as well as make them more motivated to share important knowledge and information with their manager.

Subordinates will simultaneously feel a higher level of job-satisfaction as they can see their information and ideas are of importance for the success of the project. Subordinates as well as managers want to know that they are doing a difference for the company and that their performance

is indispensable. Employees become truly empowered by understanding the company's wishes to accomplish, and how they can contribute to these accomplishments. This understanding generates intrinsic motivation as employees know that their work and efforts can make a difference to the company.

The overall strategy of the company or project is independent on the efforts and skills of all its employees and will only be successful if everyone in the company understands the strategy and helps to implement it. Managers need to understand that they cannot implement strategies themselves. They need contributions, actions and ideas from all subordinates within the company or a specific project. Subordinates often know more than their manager when it comes to when technical problems will occur. For that reason do the subordinates have to learn how to influence up, down as well as across in the hierarchy. However it is the manager's responsibility to teach the subordinates to share their knowledge with colleagues and managers and not to be afraid to do so. That is one of the largest tasks for a manager, who works on a partnering project (Segil, et. al., 2003).

#### **4.3.4 Managing the relationship**

Building good relationships or partnerships two or more partners together, require a mutual understanding and respect of each others individual goals, needs and routines. It takes ten times as long time to build up a relationship than it takes to destroy it. It is the manager's task to build and maintain a partnership where collaborators are working together to accomplish predefined tasks as well as create a shared vision. Collaborators work together to build commitment and to maintain alignment with the vision and use the skills and energies of all partners to handle changes and deal with adaptive challenges.

*“In partnership, the source of a vision is the relationship; vision emerges from the reciprocity, from the give-and-take, of a relationship”* (Segil, et. al., 2003).

Why is it that important to maintain personal relationships in partnering projects? Time schedules, the complexity and the economy within construction projects are more and more depending on effective and special skilled managers, who work closely together with each others. Leadership often emerges from teamwork where differences are honoured, assumptions suspended, and the

quality of interactions among team members is good. Synergy does produce better results than what any individual can accomplish alone. That is one of the reasons why managers in partnering projects must be concerned about maintaining their good relationship to their external as well as internal partners.

Another way to rebuild a relationship in a partnering project is by minimising bureaucracy and eschews job titles but instead use job functions, thus everybody within the project feels that they are an important part in a big puzzle and hence feel energised and inspired to work for one shared project goal (Cain, 2004). Finally it is within partnering projects required that all parties are engaged in the project as well as appear responsible and accountable.

Finally, are an accurate leadership style and personal attitudes, charisma and skills within especially long-term partnering, also called *strategic partnering*, of large importance for success in a partnering project. Managers in partnering projects must be motivated and skilled to do partnering and be prepared to “give up and loose” ideas, needs and demands in order to obtain the largest benefit of the collaboration. The largest benefit of partnering comes when partners have a mutual respect for what other partners bring to the table and also when partners have worked together for a longer period of time or during several projects (strategic partnering). When for instance the general contractor knows his sub-contractors well, then he also knows what they are good at and what they are not good at, as well as opposite. For that reason, it is crucial that personal relationships among partners remain good thus partners can collaborate with each other on more than just one single project (Critchlow, 1998).

Managers in partnering projects must in general focus on not only their own needs and goals but rather on similarities and differences among partners and in that way avoid problems before they occur as well as be prepared and expect diversity in opinions about solutions and new ideas (Cain, 2004).

## 4.4 Leadership within Lean Construction

### 4.4.1 Changing the culture

Within Lean Construction, all efforts for improvements must be directed thus the overall improvements of the project are generating value for the client, since this is more important than reducing the costs or increasing the efficiency of any single activity. To integrate the suppliers and sub-contractors successfully, there must be a shared understanding of common goals and an equitable distribution of risk and profit. None of these activities will happen successfully without a clear and committed leadership of the supply chain and the construction process (Bertelsen, 2004).

To ensure that all parties in a construction project are working for the same goals, everybody within the project must be integrated in the company's culture in a sufficient way. It can be difficult to get external as well as internal employees of a construction project to understand the ideas behind Lean Construction and understand why the company want to use this philosophy as a part of their overall business strategy. What makes Lean Construction difficult to fully implement in a construction company is the fact that the philosophy, as earlier mentioned, is developed by the Japanese car manufacturing company Toyota. First, Toyota is placed in a country with a quite different working culture than in for instance Europe and USA. Second, they are building their cars under the same controlled conditions every time they make a new car, which makes it easier for Toyota to effectively produce a car compared to build a building, which often is constructed in bad weather conditions. Simultaneously are two buildings often not the same (Bertelsen, 2004).

In Japan they have for generations been working hard, disciplined and more controlled and managed than employees in for instance Europe have been used to. Those issues have to be taken serious if a company wants to obtain the real benefit of the Lean Construction philosophy. Otherwise, they will see a mismatch between intentions and interpretations of the procedures behind the Lean Construction philosophy (Jørgensen et. al., 2004; Bertelsen, 2004).

Wild (2002) says that in a temporary organisation, such as a construction project, the lack of an efficient and formal communication network is highly problematic since social and interpersonal relations need to be re-established at every project, unless the entire construction organisation is continuing together on another project. The combination of a new organisation on each project

without formal procedures known by everyone and a large complex and one-of-a-kind project is likely to cause considerable problems to coordination and control over the construction process. This fact is one of the largest pitfalls to a successful implementation of the lean thinking into the construction industry, as one of the cornerstones in the lean philosophy is that everybody is doing a unique work as well as know what, why and when others within the production are doing other tasks. The Lean Construction philosophy has further been criticised for omitting human resource management issues for a successful implementation in the European construction industry (wild, 2002).

#### **4.4.2 Minimise waste and specify value**

In Lean Production as well as in Lean Construction, the value of a product is defined solely by the end-use customer. In the construction industry it can be the client as well as the persons who are going to use the building when it is finish. However, the building must meet the needs of the customers and the users of the building to a specific time, quality and price. Things the contractor is doing in the working process, for instance setting up scaffold and shuttering, transportation, movement and waiting time etc. which does not generate any directly value to the customer, is not of any interest. Construction managers must be ware of the suppliers', sub-contractors' and especially the client's needs, demands and ideas about how to construct the building in the most sufficient way, by making them clearly specify which activities that create value. Specifying value in interpersonal relationships means simply that construction managers must learn to understand the wants and expectations of the parties that they interact with (Womack and Jones, 2003; Emiliani, 1998; Åhlström and Karlsson, 1996).

The reduction of waste, within the Japanese production system called "*muda*", and the reduction of non-adding-value activities, is always an ongoing activity. The construction manager must ensure that everybody is working for that goal and that everybody stops or changes non-value-adding activities, when they occur. The construction manager has to focus less on the end-product (the finish building) and more on the ongoing construction process. If the building process is good and the quality of work is high, then the finish building will also be of a high quality as well as be delivered on time to the client (Cain, 2004). Construction managers try to reduce the amount of waste by a forwarded and effective planning and take initiative to correct failures and mistakes when they are discovered (Bertelsen, 2004).

#### 4.4.3 Identify value and plan the workflow

In construction, the value stream comprises all the transformations required to bring raw materials, prefabricated products and know-how to a completed project, ready for use. Leadership is the essential component to make it so. Effective collaboration encourages effective information management, which is essential for effective planning, scheduling and problem solving. The introduction of the concept “workflow” or just “flow” is probably the most important contribution to the understanding of the construction process from the Lean Construction philosophy.

The Finish researcher in Lean Construction, Lauri Koskela has identified seven flows towards the perfect execution of a work package; *previous work, space, crew, equipment, information, materials and external conditions such as the weather, transport congestion and political decisions*. Each of the seven flows has its own nature as well as its own uncertainties, which means that construction managers have to deal with each of the seven flows in different ways for each construction process (Howell and Koskela, 2000).

To identify the seven flows, the construction manager working on-site needs to make a detailed planning, in Lean Construction called “last planner”, made from the master plan or master time schedule. The detailed planning is normally running for five to six weeks and down to one week. Within Lean Construction this planning system is called WPP (week, period and process plan). The “process plan” is within Lean Construction usually called the “master plan” or master time schedule.

Each week the construction managers, foremen and gangers of the different trades review the week plan. The purpose is to assure that as much work becomes due, the necessary materials are at hand and all prefabricated work is completed. Every effort is made to assure that most ordering of materials and preparation of work can be performed within the coming week. However, it is also important to focus on the next five to six weeks in order to ensure that everything is in place when it is time to perform a specific activity.

Each week the “last planner” team<sup>7</sup> commits to the plan for the following week. The most important thing is that everybody commits only to what should be done. Once the commitment is made, each

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<sup>7</sup> Foremen and construction managers who together are making the week schedule for the coming week

crewmember is expected to meet its commitment, and success is measured in terms of meeting the weekly promises. The “last planner” system reduces variability in construction planning, because it is a closed loop control system. Work is not planned by the master time schedule, but by real people “last planners”, who makes detailed short-term plans based on what materials are actually available, what the near-term weather forecasts say, whether the previous crew can be trusted, which crewmembers are available for the job, etc. The reliability of these plans has resulted in enormous productivity gains and a significant reduction in construction site problems (Jørgensen et. al., 2004).

It is difficult to control and manage the flow from a master plan as many things in the process can and often will change by time. The construction manager must for that reason always have a detailed process plan, especially in the end of the construction work, where a lot of construction workers are working on the construction site and everyone is busy. The week plan helps the construction manager to coordinate the flow thus congestion can be avoided and building activities can be finished as scheduled. The detailed period and week plan compared to the overall process plan helps the construction manager to meet the changes and hence effectively plan the construction activities thus the construction workers can perform right the first time and not have to change or rebuild over again later. This is the largest duty within leading a construction process for construction managers working on-site in a construction project (Bertelsen, 2004; Emiliani, 2003).

On Toyota’s production factories in Japan each production worker has the authority to stop the entire production system, also called “stop-the-line”, when they discover a serious mistake in the process. This approach is not that easy to implement on a construction site and probably not that effective either. The reasons are that the different trades on a construction site are not fully dependent on each others work as well as it is difficult to do so without spending a lot of unnecessary time on it. Construction managers must instead rely on their subordinates’ judgement on how much more work they have left and then support them in planning how much crew they need to put on specific tasks, when to order materials and equipment and then together make a detailed planning. The planning must be based on percentages completed previous work according to the time schedule, which and how much work has to be done in the near future and which factors can be a pitfall to a successful performance of the building process (Bertelsen, 2004; Howell and Ballard, 1998).

#### **4.4.4 Supply chain management and logistic**

As early as possible in a construction project (in the pre-design phase if possible) the suppliers in the supply chain need to be brought together with the consultants to share and integrate knowledge, know-how and information. This will facilitate the consultants to work together with the suppliers and the contractors to be innovative, to explore alternatives and so achieve best value for the client. Further, it will enable hauliers to be integrated into the project, to minimise wasted transportation and essential to enable “just-in-time” delivery.

Planning is clearly a process of prediction. It is easy to overlook that every decision also requires prediction. Much of the staggering amount of waste in construction production does not come from faulty planning and decision-making, but from poor prediction due to uncertainty. The existing value stream is so fragmented and discontinuous that the number of variables and unknowns make effective prediction impossible. The solution is to focus not on making each link in the supply chain profitable, but on improving prediction and decision-making throughout the supply chain. This will generate profit for all and at lower total cost as the key is to integrate information and materials flow. By focussing on the process and not just at the “end-product”, construction managers will automatically produce a better and cheaper building and within the time schedule. It is often not recommendable to develop new guidelines, routines, schedules etc. but rather to focus on the company’s core business by simplify processes, create synergy between the subordinates as well as between the subordinates and the managers and aim at having effective teams working together for longer periods as well as secure that key-personal remain working in the company (Bonke, 2005).

To make an effective supply chain and process planning of the building activities, the construction managers can use different tools from the Lean Construction philosophy. Three of the most well-known tools are “Just-In-Time” delivery of materials and larger equipments, such as cranes and trucks, “Pull instead of Push” delivery and “PPC schedules” (process, performed and completed work). The “Just-In-Time” delivery is one of the issues within Lean Construction. The term “Just-In-Time”, used for instance to describe the delivery of materials to a construction site, suggests that materials will be brought to their location for final installation or mounting or construction and be installed or mounted immediately upon arrival without any delay due to storage in warehouse or at a material area on site. By doing so, the objective of just-in-time delivery is to supply the right

materials at the right time and in the right amount at every step in the process (Jonsson and Mattsson, 2005; Womack and Jones, 2003; Tommelein and Weissenberger, 1999).

Just-in-time delivery can be performed in several ways by taking use of different management tools. Within Toyota's Lean Production system, Toyota achieves just-in-time delivery by using, what they call "*Kanban*". "*Kanban*" is a card which automatically is send to the supplier of a specific product, when there are only a predefined number of items left. That prevents overproduction, unnecessary storage of materials before they are going to be used, which prevents destruction and negative capital. Unfortunately, construction work is different from manufacturing work for several reasons. First, one of the largest differences is that within the construction industry, buildings are often "one-of-a-kind" production, which means that the use of *kanban* (delivering cards) is difficult. Second, the number of suppliers is also higher than it is within the manufacturing industry.

Despite visible differences, the use of *pull* delivery is to prefer compared to the traditional *push* delivery as the push system tend to increase the amount of waste. (In short, pull delivery is where the contractor first receives the building materials, when he asks for them, where he in push delivery receives them when the suppliers have produced them).

Within construction work, construction managers must therefore be extra aware of the problems with delivering of materials if they want the materials to be delivered just-in-time on-site. Construction managers must map key construction processes as well as buffers in between them in order to elucidate where resources are held up versus where they are able to flow. Uncertainties and variability cannot be taken for granted by the construction manager, and they must be acknowledged, managed and minimized to a reasonable degree. One technique to identify uncertainties and variability's is to reduce the buffer sizes in between various production steps in order to see and learn the extent to which they are needed. This means, the construction manager together with the subordinates (foremen and gangers) must be able to pull materials through all upstream processes, including not only fabrication but also permitting and design. That can only happen if the construction manager has a good and effective cooperation with the subordinates (Tommelein and Weissenberger, 1999).

#### 4.4.5 Continuous improvements

The construction process has to strive for continuous improvements, in Japanese called “*kaizen*” which is one of the essential elements within Toyota’s Lean Production system. If you are not constantly setting new standards and goals and not always strive for perfection, then you will never obtain continuous improvements but get stoked at some point. Zero defects in the construction are the final goal, but as *kaizen* means continuous improvements it is not achievable to attain that goal. According to Bertelsen (2005) 100% perfection is not possible to attain. The reason is that, if you obtain 100% perfection then your goals are too weak and easy to obtain and the possibility for further improvements is not yet possible. Consequently, does the philosophy of continuous improvement not exist anymore (Womack and Jones, 2003).

*“The concept of perfection in lean production means that there are endless opportunities for improving the utilization of all types of assets...While perfection will never be achieved, its pursuit is a goal worth striving for because it helps maintain constant vigilance against wasteful practices...and to easily identify and eliminate behaviours that do not create value to the project or most important to the end user of the product”* (Emiliani, 1998).

Construction managers must personally participate in the process of continuous improvements to simultaneously develop new technical skills and beliefs. The construction manager must be able to lead this process up-site-down as well as the other way. Finally the construction manager must establish an environment, where new beliefs, behaviours and competencies can be realized through continuous improvements that support the company’s as well as the project’s overall business strategy, mission and goals (Emiliani, 1998 and 2003).

#### 4.5 Leadership within BygLOK

BygLOK is not a theory but rather a program intended as a supplement for a successful implementation of partnering and Lean Construction on construction sites. Within the program are different, primarily HRM<sup>8</sup> theories, used as the overall objective is to support the development of a profitable construction work life. The theories focuses on having the construction workers working with a high degree of joint influence and make them constantly develop their professional and

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<sup>8</sup> The abbreviation of HRM stems from “Human Resource Management”

personal competences. Subsequently, the construction workers must take ownership in their daily work as well as work with a high degree of responsibility.

#### **4.5.1 Close collaboration**

In 2003 the results from the European research program CEDEFOP<sup>9</sup> pointed the fact that when conducting an analysis of a learning environment, it is necessary to take the interest of involved participants into consideration and relate it into a tangible structure as well as a intangible culture of the construction site (Elsborg et. al., 2004).

One of the construction manager's largest tasks on a modern construction site is, according to Elsborg et. al. (2004), to be heavily involved in the changing process away from the old-fashioned norms and traditions, which often rules on construction sites. This has to be accomplished by establishment of a close interplay between formal and informal learning among the managers and the subordinates on-site. The construction manager has to focus on that the learning as well as the information process is initiated bottom up. The construction manager must furthermore focus on the development of personal and collective competences within the collaboration and a high level of two-way communication, thus competences of the construction workers and the suppliers can be used effectively in the construction manager's and foremen's site planning.

The "Last Planner System" by Glenn Ballard is in short saying that operational construction process plans must be made locally and with a short time horizon. The benefit of involvement of construction workers (foremen) in the construction process planning is often underestimated even though their competences are of great importance for a development of a more effective construction process to the benefit of all parts in the entire construction process (Howell and Ballard, 1998). Doing so, creates a more effective and safer construction process as well as yielding for a higher job satisfaction for all parties involved in the process (Elsborg et. al., 2004).

The construction manager must be charismatic, informative and show the subordinates trust as well as give them co-responsibility. The construction manager must stimulate them, increase their competences and bring their knowledge, experiences and skills into play in the preparation of the

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<sup>9</sup> Cedefop is the French acronym of the organisation's official title, European Centre for the Development of Vocational Training (Centre Européen pour le Développement de la Formation Professionnelle).

weekly work and planning (Bertelsen, 2004; Elsborg et. al., 2004 and Elsborg and Dam, 2003). Despite these statements, Boatwright (2002) states that engagement of the subordinates in the planning of their own performance and tasks may only be a success if the subordinates have the necessary skills and commitment to do so. Without the commitment and motivation to be involved in the planning of your own work, it will never be a success and the subordinates will occur passively in their behaviour and relapse in to old working routines when novelty interest has run out (Mullins, 2003).

#### **4.5.2 Meetings etc.**

If the BygLOK program has to be successful, construction managers must create a construction site culture by focusing on success stories and situations from other construction sites, where subordinates felt interested in creating their own workplace. In order to create a new and different site-culture, the construction manager must participate actively in workshops, team building sessions, weekly meetings etc. The construction manager must ensure that these events are held in a constructive way and that the subordinates feel free to talk about problems they have, and make suggestions for new working routines and processes. If the construction manager does not feel confident leading those meetings because of lack of education, skills or something else he or she may ask his or her own manager about the possibility to use a professional facilitator. The facilitator is educated in leading such meetings, thus a constructive conversation will appear among the managers and the subordinates and respective between (Elsborg et. al., 2004).

One way of kick-starting the weekly meetings is by having a brainstorm where everybody is taking part and gives their ideas about what can be improved within the construction processes, the collaboration and the solidarity onsite as well as the communication between the managers and the subordinates (Johnson and Johnson, 2003). Ideas and suggestions agreed on these meetings can eventually be written down and pinned-up and placed where all the construction workers and managers can read them. In addition, it can be a good idea to make space on those papers for comments and ideas. The pin-ups have two purposes; first, in case somebody does not have the courage to propose their ideas and opinions on the formal meetings, they still have a chance to state their opinions and second, it provides a breeding ground for new conversations on the next meeting (Elsborg and Dam, 2003). In any case, the meetings have to have a predefined agenda for at least half of the time set for the meeting. The meetings must never be seen as a waste of time among the

construction workers as it will automatically influence the entire program in a negative direction and the construction workers will relapse into old habits as they find the meetings uninteresting and a negative factor for keeping up their piecework (Bertelsen, 2005).

#### **4.5.3 Managing conflicts**

Managing conflicts before they transform into a serious, and often, insoluble conflict is often an underestimated issue among construction managers. Conflicts can be of different character depending on whether the conflict is having a technical or personal character. Technical conflicts are fortunately the most common type of conflicts and they can normally be solved by constructive two-way communication among the different actors involved in the conflict. For that reason it is also important that the conflicts will be solved before they turn into be a personal conflict, as it is much more difficult to solve such a conflict effectively, as it is a personal attack on another person's behaviour and personality (Johnson and Johnson, 2003 and Jacobsen and Thorsvik, 2002).

The BygLOK program is one way to prevent and solve serious conflicts in a fast way because the subordinates together with the construction managers and even sometimes with the consultants and advisors once a week hold meetings, where problems and conflicts, trades, the managers and the subordinates between are discussed. Construction managers who work with project management and HRM must continuously work on developing his or her communication skills thus he or she has the skills to communicate in different "languages". The manager must attempt to build a shared frame of references with and among the subordinates, which can be used to improve the collaboration and communication. By building up a constructive interplay, the top-down development as well as bottom-up, development process can be improved significantly. It is the mutual respect and understanding of each other's problem and ideas that creates effective communication, which is the key to solve conflicts at lowest possible level and in the smoothest way (Elsborg et. al., 2004).

#### **4.6 Summary and comparison**

Partnering is primarily between the client, the construction company and the consultants. Sub-contractors and suppliers can also take part in the partnering process. The partnering process is normally beginning before the construction work is beginning as it is in this phase of the project the

overall frames of the project is discussed and decided. It is normally only a collaboration manager's between (Busk, 2003).

Lean Construction is more a philosophy for improvement of processes by eliminating of waste. It is primarily collaboration between the general contractor and his sub-contractors. The Lean Construction work is an ongoing on-site process. The client and the consultants are not involved in the Lean Construction work as they are not a part in the daily construction work on-site (Howell and Ballard, 1998).

BygLOK is the newest way of collaboration within the construction industry in Denmark. The BygLOK program is an ongoing collaboration at the bottom of the organisational hierarchy. The collaboration is between mid-size managers and their subordinates, primarily between the construction manager and the construction workers (Elsborg, et. al., 2004 and Dam & Elsborg, 2003).

Since, partnering as well as Lean Construction are focussing on optimising the overall goal of a construction project, it has resulted in that many contractors have found it difficult to motivate their construction workers to take an active part in that process. Construction workers do often see partnering and Lean Construction as time consuming processes, which do not have any effective influence on their performance and job situation. BygLOK can maybe be a kicker to upstart that process, where also the construction workers ideas are taking into consideration, when process plans and time schedules are made. BygLOK is containing the tools to create a more mutual process where competences and ideas of the subordinates are more effectively used. However, the BygLOK work can also be seen as a time consuming process if it is not planned carefully. Hence it is important, that the construction workers do not feel that workshops, meetings and other non-building activities are a waste of time and hold down there piecework contract (Elsborg et. al., 2004). The schedule on next page is showing differences and similarities of the concept of partnering, the philosophy of Lean Construction, and the program of BygLOK.

The schedule is intended as a schedule which in brief is showing focus areas of partnering, Lean Construction and the BygLOK program.

<b>Similarities / Differences</b>	<b>Partnering</b>	<b>Lean Construction</b>	<b>BygLOK</b>
<b>Economy, budget and time schedule</b>	Between the client, the consultants and the contractor in the preconstruction phase. The three parties agree together about a fixed target price and time schedule as well as eventually risks during the project.	In the daily on-site work by having weekly process meetings. On these meetings construction managers and supervisors from the different trades discuss current and upcoming problems. Solutions are made in collaboration.	Not directly but indirectly by construction managers listening to construction workers ideas, concerns and dissatisfactions during the weekly meetings. It is the construction workers who has the technical experience etc.
<b>The pre-construction phase</b>	It is in this phase of the project that partnering is most used.	Lean Construction is primarily not used in the preconstruction phase.	BygLOK is only between construction managers and subordinates in the construction process on-site.
<b>The construction process</b>	The partnering agreement is running during the entire project but the agreement is made in the preconstruction process.	It is in the construction on-site process that Lean Construction has its forces.	BygLOK is only between construction managers and subordinates in the construction process on-site.
<b>On-site problems and conflicts</b>	Partnering is primarily collaboration between managers one another.	Lean Construction is primarily focussing on technical issues rather than personal conflicts.	BygLOK is focussing on the collaboration construction workers and managers between.
<b>Human resources and competences</b>	The cornerstones of partnering are trust, respect and mutual goals different parties between. Partnering is however not specifically focussing on human resources and competences.	Lean Construction is a tool for optimising processes but not in particular by having focus on issues as competences and communication among construction managers and subordinates.	Human resources and competences are important issues within BygLOK. The objective of BygLOK is to support subordinates' development, influence and job satisfaction.
<b>Collaboration and communication</b>	The level of collaboration and communication has to be high and effective within partnering.	Lean Construction can sometimes suffer because of a lack in communication and effective collaboration.	BygLOK is focussing on a close collaboration and effective communication construction managers and subordinates between.

## **5 Methodology - interviews**

The interviews were prepared by using the following 6 keywords; Thematizing, Design, The interview, Writing out (notes from interviews), Analysis and Confirmation (Olsen & Pedersen, 2003 – own translation). The questions for the interviews were made out from relevant theory within partnering, Lean Construction and especially BygLOK and BygSoL. The questions have further been adjusted between the two interview sessions based on the answers from the first session.

### **5.1 Thematizing**

The primary goal of the interviews was to investigate whether the workers working on the experimental construction project feel any differences compared to working on a traditional construction project. The idea behind this method is to observe whether the integration of partnering, Lean Construction and BygLOK has any positive influence on the construction workers, the foremen and the construction managers working on-site as well as for NCC in general. Further, it has been my purpose to identify possibilities and pitfalls for a successful implementation of the integrated concept.

### **5.2 Design**

The interviews are designed thus the overall issue and the purpose of the study are processed in the same way during each interview. However, it does not mean that the questions are similar for all employees working on the experimental construction projects. Two sets of interview questions have been prepared; one set of questions for foremen and construction managers and one set of questions for construction workers. The purpose of doing so is to obtain a balanced result of the interviews thus different opinions can be compared in the final evaluation of the integrated concept. The question sheets are constructed by using “the seven step guideline” (Bjerg, 1999 - my translation).

The seven steps are useful to obtain the most precise answers in the interviews as they help the interviewer in preparing the questions for the interview. The seven steps must be avoided to ensure a high level of quality of the answers given by the interviewees. Consequently, the seven steps are also called for “the seven deadly sins”, and are as follow:

1. It is considerably and important that the interviewer asks the interviewee questions thus the interviewee is forced to answer the questions asked. It reduces the interviewee's chances to bring up insinuations and statements thus the interviewee can avoid the issue and take control of the interview.
2. Avoid asking two questions at the same time. Doing so, the interviewee can choose which one of the questions he or she wants to answer.
3. Avoid statements after asking a question. Otherwise, the interviewee will focus on the statement rather on the question and consequently not answer the question.
4. Avoid exaggerations as it removes the focus from the primary in the question to the exaggeration adjectives of the question.
5. Avoid trigger-words, which can provoke the interviewee and change the attitude thus he or she gets angry or un-collaborative.
6. Avoid guiding questions as it forces the interviewee to answer the question in a predetermined way.
7. Avoid questions which can be answered by a YES or NO unless you want to ask a question which only must/can be answered by a YES or No such as "Have you been working in the company for more than 10 years?"

### **5.3 The Interview**

During the study I have interviewed sixteen construction workers and six construction managers all these worked at the case project. The reason for the relatively small number of interviews is because of the small number of construction workers and managers employed by NCC on that specific construction project during the period I performed my interviews. The interview questions to construction managers were different from the interview questions to the construction workers. All interviewees are anonymous in order to facilitate the best and most honest answers. My supervisor at NCC approved the questions before the beginning of the interviewees.

The aim of the interviews was to expose different opinions of how it is to work on an experimental construction project, where partnering, Lean Construction and BygLOK are integrated in one construction project. The different parties interviewed were construction workers, gangers and foremen, construction managers and a project manager.

The interviewed parties were in the age of 25 to 65 years old and have all been working directly on or in relation to the experimental construction project from its beginning. Hence, it is possible to study whether differences in age have any influence on people's interest and resistance towards working with new ideas and processes. The interviews took place on the construction site, thus they were performed in a formal but also a comfortable environment. The interviews were individual and lasted for approximately half an hour each. The interviewees had not seen the questions before the interview took place. They were not recorded, because recording can give the interviewee the feeling that it is an examination or police questioning (Olsen & Pedersen, 2003). Each interview began with a short briefing about the background of the study and the interview. The interviewee was also informed that the interview was anonymous.

#### *Writing out*

All notes taken during the interviews were collected and written into a summary. The summary is subsequently shown to the interviewee.

#### *Analysis*

The analysis part of the study is partly based on the interviews. The interviewed person approves the interview after a summary of the interview is conducted. It is important that the summary is in accordance with the statements and the opinions of the interviewees. Answers from the construction workers doing the first interview have inspired the preparation of the questions for the second session of interviews with the foremen and construction managers and visa versa. Statements from the interviews are compared and analysed with the aim to clarify different opinions to the same problem and finally is the interview results compared with relevant literature.

#### *Confirmation*

Sixteen construction workers and gangers as well of six construction site managers have been interviewed. They have all been interviewed individually but within the same issues. That makes the reliability of the answers relatively high, provided that they have answered the questions in the same way. The interview questions have been modified after the first interview session thus they were more precisely in according to the outcome from the first interview session and secondly because of theoretical findings in the period between the two sessions.



## **6 Findings**

The findings are based on interviews made on an experimental construction project located in Copenhagen, Denmark. The specific construction project is chosen among two experimental construction projects. This construction project was chosen as it was in the beginning phase of the construction period and because most of the construction workers on the project are employed by NCC. Secondly, is the other experimental construction project involved in another research program. For further information's about the empirical data see appendix 1, 2 and 3.

The interviewees' opinions, arguments and knowledge about the integrated construction project of partnering, Lean Construction and BygLOK are described in the following sections. Findings are divided into six different issues, which all are connected to the theoretical framework. The first three sections are starting with general elements for having successful employees on a construction site and the last three sections are more projects related when it comes to how to improve the performance and reduce mistakes and waste in construction projects.

Statements of the interviewees have led to a number of relevant issues, which will be discussed and compared with the applied theory in chapter 4. The findings will for that reason together with the theory give the answers to the problem and purpose of this thesis.

### **6.1 Job satisfaction**

Several of the interviewees, managers as well as construction workers, stated that by having challenging tasks; they get more motivated, compared to routine based tasks, decided and delegated by their manager. The construction workers and managers argue that challenging tasks give them the feeling of responsibility and commitment. The general explanation to that statement among the interviewees was that having influence on the working process motivates people to work for a better result within the frames of time, budget and quality.

Despite the general agreement there were a difference between what the construction managers and what the construction workers experience as the most important factors to make them fell satisfied in their job. Both the construction managers and the construction workers mentioned good colleagues and challenging tasks as some of the most important factors, but for the construction

workers was those two factors not isolated. Almost half of the construction workers claimed that the accessibility to construction materials and especially working tools to perform their job are important factors to what make them happy in their job. In addition, several of the construction experienced factors such as safety, information from the construction managers as well as a close and rewarding collaboration with the leadership of the construction project to be some of the important factors for them to be satisfied in their daily job.

Finally, almost all the interviewees felt that the salary is relevant to their job satisfaction, but several also expressed that their salary is not the most important factor and others that it is hard to change the salary to something better.

## 6.2 Information level

One of the questions to the construction workers was whether they feel any improvements in the level of information from the construction managers in this specific project compared to other construction projects where they previously have worked. The majority answered this question by *yes*.

The interviewees who answered “yes” argued that the weekly meetings held together with their colleagues and the construction managers, make them feel more informed in not only what they themselves are performing but also what other gangs are performing as well as going to perform. The sharing of information has according to a number of the interviewed construction workers, three purposes; first, sharing of information between different trades and gangs. Second, a motivating factor for all involved construction workers in the construction project as it gives them a better view of the entire process and project. Third, it makes them feel as they are an important part of the construction project as the construction managers are listening to their ideas and take use of their competences.

One of the construction managers expressed:

*“you can quite easy motivate and make a construction worker feel proud of what he is doing simply by informing him in the entire process of the project...it is better for a bricklayer, to let him feel,*

*that he is an important part of a large, well-known and spectacular construction project, than it is to have the feeling that you are a bricklayer, who has to lay 1000 brick per day in more than half a year”.*

Despite the positive impact the weekly meetings have on the majority of the interviewees, some of the interviewees did have another attitude towards these meetings. A few of the interviewed construction workers as well as the construction managers expressed that the meetings are not structured satisfactorily and subsequently they found the meetings a waste of time. One of the interviewed construction managers expressed:

*“It is not a kindergarten or a coffee club but a construction project we are working at. We are not going to build any houses by sitting down and discuss the world situation or the weather”.*

Expressed in other words, some felt a lack in information about to what purpose the meetings are hold and why all construction workers and not just the gangers have to participate in these meetings. Some of the construction managers further argued that it is primarily few, and always the same, construction workers who actively take part in the shared weekly meetings. The rest is not even listening as they see them self as subordinates to the construction managers and are not interested in taking part in the planning etc. One construction managers expressed the following:

*“Most of our construction workers like their job as construction worker and are not interested in any kind of non physic work. Many of them do not want to be managers and for that reason they cannot see why they have to take part in these meetings”.*

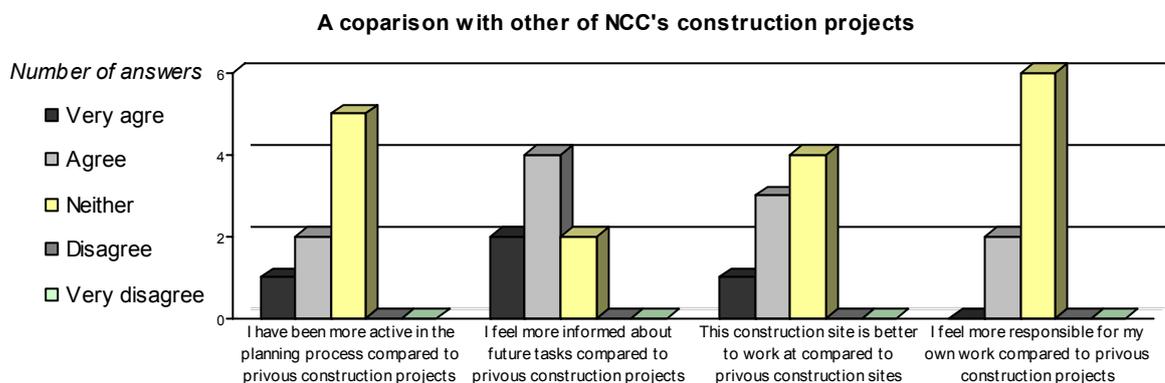
Effective and sufficient information between construction managers working on-site and non on-site managers, who have been a part in the company’s development and implementation process of the BygSoL program, are also of high importance. According to two-thirds of the construction managers working on-site, they do not feel that they are sufficiently informed, trained and educated within especially the BygSoL program as well as within the working tools of Lean Construction, which NCC is using. The construction managers expressed that it is difficult to pass on and transmit necessary information to the construction workers if the construction managers do not have it himself. Especially the foremen did not feel that they are sufficiently educated within the program.

Some construction managers expressed that the foremen are sufficiently educated within the program, while others found it disappointing that the foremen are not more interested and engaged in the daily work, as they are the one of the managers who are in the closest contact with the construction workers and the involvement in their work.

A construction manager expressed the following:

*“It is difficult to inform, motivate and explain ideas and visions about the concept of BygSoL if your are not sufficiently informed about it yourself.....Many construction workers are often giving me critical questions about why we are doing so and so, but I cannot answer them as I would like to do – that is not sufficient...I definitely miss some kind of introduction to the BygSoL program”.*

Even though the majority of the construction managers expressed them self positive towards the way of sharing information within the BygSoL program, a few of them were not impressed about all of the elements within the program. These persons, who were foremen, argued that they often are discussing the same things at different meetings and consequently they feel that they are wasting their time, which is inconsistent with the foundation of the Lean Construction philosophy, where focus is on elimination of waste. The rest of the construction managers found the sharing of information relevant and were not agreeing in the statement. They argued that they were sharing necessary information at different levels, as partnering is mainly between the client, the general contractor and the consultants, where for instance BygLOK is between the construction managers, foremen and the construction workers.



**Figure 3.** A comparison of the effectiveness of the planning as well as the informational and the motivational level on the experimental construction project compared to other construction projects, where eight interviewed construction workers have worked on previously.

(Source: See appendix 3.)

### 6.3 Mutual trust and respect

Several, construction workers as well as managers, expressed that because of a more directly and closer communication between managers and subordinates the trust and respect to each other have improved. Especially the construction workers stated that they feel a higher level of respect for their manager's decision if he or she has converse them before he or she takes a decision. About half of the construction managers do however feel that in order to retain such a relationship, managers and subordinates need to spend quite a lot of time to do so. One of the construction managers expressed the following:

*“As a manager in a BygSoL project you continuously have to strive for improve, or at least retain, a good relationship with your subordinates. That applies whether they are interested or not ...It can often feel as time consuming because several of the construction workers are very rigid in their working routines. Some construction workers relapse into old habits, the first time they face problems with new working routines, ideas or forms of collaboration”.*

Another thing that some of the construction managers mentioned was that it takes months to build up a good relationship, but it can be broken in just a few seconds.

### 6.4 Involvement of construction workers in the planning process

Despite the fact, that the length of the planning process often increases as more people get involved in it, it has however, in accordance to the construction workers and managers, been one of the issues within the BygSoL program, which has been most valuable. The construction workers' performance has increased radically in this project, primarily because of a better process planning.

A number of the construction workers explained the following; construction managers in this project have taken more advantage of the construction workers' skills, knowledge and experiences compared to the use in a traditional construction project. Two-thirds of the construction managers and construction workers said that the performance, motivation, engagement, commitment and the sense of responsibility of the construction workers increase noticeable when they have a word to say in the process planning. One of the construction managers expressed the following:

*“By involving the construction workers in the process planning and actively use their ideas and knowledge, the individual construction worker feels much more happy and takes personal responsibility for the work he is performing...In that way he does also use his own skills and change something wrong to what he, as construction worker, knows is more correct”.*

Almost the same did one of the construction workers express:

*“My motivation to do a good job and to do it right the first time, is much higher when I have been involved in the process planning of my own work...I can not go back to the construction manager, and claim him for something I myself have been a part of”.*

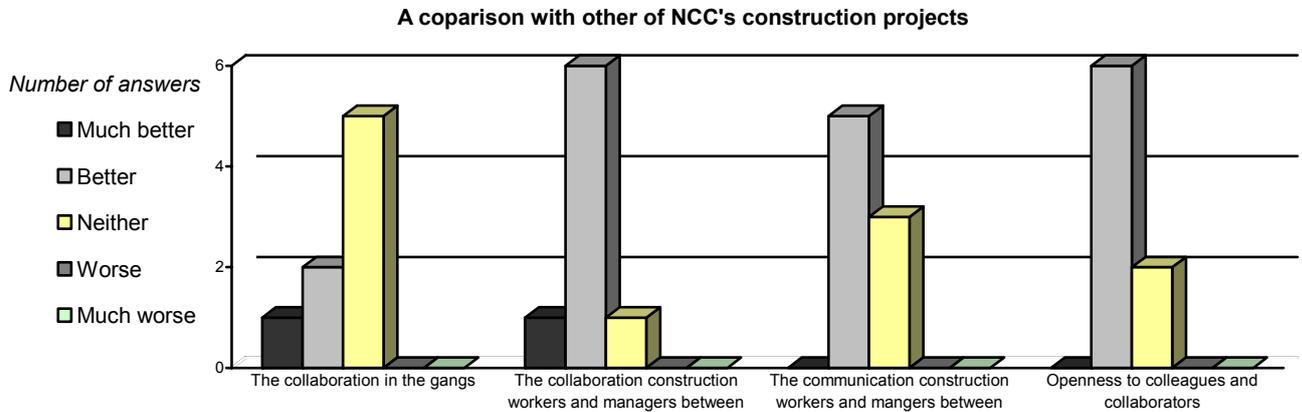
Another construction worker expressed the following:

*“It is for me both personal and job related interesting to know, what not just I am working with in this project...I find it interesting, when the construction managers each Friday inform about what their plans are for the coming week, especially when they have changed the plans based on our suggestions to do something differently”.*

In general were the construction workers and managers positive about having the construction workers involved in the process planning. More than one-third of the construction workers expressed that this construction project is more effectively run compared to other construction projects, where they previously have worked. Despite the fact, that a couple of the construction workers, and one of the construction managers, thought it is negative to have the construction workers involved in the planning process, the rest of the interviewees did experience improvements when having the construction workers involved in the planning of the day to day work.

The construction manager who was negative about the involvement of the construction workers in the process planning stated that it is a waste of time, as the construction workers do not actively take part in the planning process anyway. Opposite did the construction workers, who were negative about being a part of the planning process state;

*“It is not my job to do the planning, that is not what I am hired or educated to do...no matter what we construction workers suggest for improvements, the construction managers never use our ideas and suggestions anyway, so why should I do it?”*



**Figure 2.** A comparison of how effective the collaboration, the communication and the openness to colleagues is on the experimental construction project compared to construction projects, where eight interviewed construction workers have worked on previously.

(Source: See appendix 3.)

## 6.5 Continuity and organisation in projects

One of the questions asked the construction workers as well as the construction managers during the interviews was;

*“Would it be an advantage or disadvantage for you as well as the construction project in general, if the construction workers and managers were working together on more than one single project?”*

The answers to this question were clear among almost all interviewees; only three out of twenty two interviewees did not see it as an advantage. The interviewees, who felt positively about working together with the same construction managers and construction workers for more than one project, supported their opinion by:

- It will make the start-up phase in each construction project much smoother, easier and effective.
- Already from the beginning of the project you know, who you are going to work with, what they are good at and what they are not good at, and who is used to do this and that.

- It will automatically provide synergy effects as effective routines and processes are not something you develop over night.
- Most people perform best in an organised and structured environment, but it always takes us half the length of a project to create such an environment on-site.

A construction manager expressed:

*“Every time we begin on a new project, we spend quite some time on explaining our sub-contractors and external construction workers how to work with safety, quality, Lean Construction etc. unless they have been working for NCC before ...Sometimes it would be cheaper in the long run to pick one of the sub-contractors, who maybe has a higher contract price on his bid, but is one we have been working with earlier and have good preferences to”.*

Another said:

*“We are maybe focusing too much on just the contract price alone and maybe too little on the qualities of the sub-contractors”*

A number of the construction workers stated that trust to your colleagues and especially your manager is something you cannot build over night. It is a continuously process and it can take months before it is established, but when it is there, everything goes much more effectively.

*“When we know the construction manager, understand him and know what he stands for, we also respect, trust and believe him in another way – I hope the managers feel the same about us?”*

All in all the majority of the interviewees agreed in the following: Continuity in projects creates synergy, increases the effectiveness as well as increases the job satisfaction among most employees.

## 6.6 Focus on core business

The most markedly criticism of the BygSoL program is concerning the time and human resources spend on the program. A number of the interviewees; construction workers as well as construction managers, stated that they sometimes cannot see the purpose of having workshops, meetings, shared eating facilities etc. Some of them expressed that they from time to time feel, the company is most concerned about making workshops, meetings and take different initiatives, which do not specifically have any thing to do with construction of buildings.

Several of the construction workers expressed that they find it difficult to understand why they often have to wait so long before they get the working tools, which are necessary for them to do their work. They find it unacceptable as it is destroying their piecework as well as their commitment to the project and their relation to the construction managers.

Moreover, some of the construction managers had concerns about the workshops, meetings etc. They felt, NCC is spending too much time and money on something, which does not directly generate money to the project. They felt they are spending too much time on activities which are not construction related and which are costly for both NCC and the specific project. They stated that NCC should concentrate and focus on what they are best at and keeps it simple instead developing new programs, activities, schedules etc. They argued that the construction workers neither are interested in this strategy nor understand all the new initiatives. Furthermore, they stated that NCC instead should improve their collaboration with the sub-contractors and suppliers, thus they have materials and a regular number of construction workers on time on their construction sites.



## **7 Discussion**

The objective of this Master thesis is to study which issues NCC must focus on, thus partnering, Lean Construction BygLOK integrated in construction projects will contribute to an efficiency of NCC's business? In this chapter, developments of theories will be presented and compared with findings from interviews results. The three main sections here are related to the three sub-questions of the thesis. Further, I give my own suggestions to how NCC can make improvements within their construction projects as well as their organisation.

### **7.1 Personal competences, skills and behaviours of construction managers**

#### **7.1.1 Involvement of construction workers in the planning process**

According to Johnson and Johnson (2003) the planning of the building processes can easily get more complicated as more people are involved in it because more people then have to agree, when decisions have to be made. Despite this, almost 90% of the construction workers and their managers mentioned that they find it fairly relevant to take use of the construction workers competences, experiences and know-how in the on-site process planning of the construction work. They argued that by involving the construction workers in the planning process, the number of mistakes in the performance process and the number of non-value adding activities as well as reconstruction of construction work can be reduced significantly. They further mentioned that the motivation increases as you as construction worker feel more as a part of the team and not just as a "construction worker", who only does what he or she is told to do by the manager.

The interviewees' opinions are closely related to several researchers', who are researching in use of employees' competences and ideas. Jørgensen et. al. (2004) argues that by using construction workers' know-how in the process planning, the "last planner" process, the outcome of the detailed planning gets much more effective and useful. He further states that it is not possible to make an effective planning without doing it on-site and for a period no longer than five to six weeks. Bertelsen (2004) and Elsborg et. al. (2004) further supports this theory. They both state that construction managers must bring the knowledge, skills and experience of the construction workers into play, if they want to increase the productivity and the efficiency in construction projects.

Despite the general opinion and statements among the interviewees a few of the construction workers as well as some researchers, Boatwright (2002) and Mullins (2003) argue the following: Engagement and involvement of the construction workers in the planning of their own performance will only be successful if the construction workers themselves have the necessary skills as well as commitment to do so. Without the motivation and commitment to be involved in the planning process, the construction workers will experience that the involvement is a waste of time and they will occur negative in their engagement and by time relapse into old working routines. Because of that, it is crucial that the construction managers identify whether, and who of the construction workers that are interested, committed and motivated to take part in the planning process. Otherwise, the involvement will just add extra costs to the project as well as be time consuming for all parties involved in the planning.

Consequently, the construction managers must focus on those who want participate, primarily the gangers. Even though motivation is fairly different from person to person and from people in one job function to another one way to motivate construction workers is as following:

1. Transform sub-contractors' and construction workers' individual goals into the goals of the project thus everybody in the project is working for the same goals and is having the same overall purpose of the construction project
2. Aim to implement sub-contractors' and construction workers' demands, wishes and ideas into the planning process, thus they feel more engaged and committed in the project. In that way they will automatically feel more responsible for the work they are performing.
3. Create an informal organisation on-site where construction managers as well as construction workers feel, they are a part of the team.

The construction project must be seen as a football team, where the construction workers are the football players and the construction managers are the coaches of the team. None of the two parties can win the football match without the help, knowledge and skills of the other part.

An interesting question you can ask yourself is:

*Is it necessary to have foremen on a construction site if construction managers involve and use the competences etc. in the planning process, which the gangers of the construction workers are in position of?*

It is of course not a question that you can answer either *yes* or *no* to. Theoretically it should be possible as construction managers together with the gangers can make the planning of the construction processes etc. without help from the foreman or supervisor. In practice and according to the construction workers it is not a good idea. First, most of the construction workers expressed that they get most of their information from their foreman and not from the construction manager. Second, the ganger will then possibly by time end up doing the work the foreman previously have been conducting. Third, the construction manager spend more and more of his or her time on non-technical activities and is in that way more a link between the gangers and the client than he or she is a manager for the detailed construction process, which the foreman is. Consequently, it is difficult to see a construction project without foremen even though the idea is relevant and interesting when the ideas within the BygSoL program are more implemented into the construction industry.

Partnering and Lean Construction makes it from an isolated point of view difficult to motivate, commit and engage the construction workers to take a more proactive part and responsibility of the work they are performing because the collaboration with the construction workers is minor. If a construction company is interested in changing that pattern, they need to involve the construction workers more in the planning process as well as share the benefit the construction company obtain by doing partnering and Lean Construction. BygSoL is one way to change that pattern. Both BygLOK and BygSoL are focussing on involvement of construction workers in the planning process. BygSoL is simultaneously creating a link between the construction workers and the construction managers as well as a link between planning and practice. Consequently, experiences and know-how from the production are taken into consideration in the planning process. By doing so, the aspects within partnering and Lean Construction are reaching out to the construction site and the construction workers will by time see and experience the ideas behind partnering and Lean Construction. You can say that BygSoL is one way to get partnering out on the construction site.

If the construction workers do not feel any improvements in their daily working life, they will not see and experience partnering and Lean Construction as a success. They will on the contrary see it as a threat to their daily working situation, as people do not like changes because you never know what they will bring you. Hence, NCC must carefully explain to their construction workers why they are interested in doing partnering and Lean Construction and most importantly explain and exemplify it by success stories and involve their construction workers in the implementation process of the new working routines etc. In addition, NCC must share the economical advantages they obtain by doing partnering with their employees, thus they get motivated to work for implementing it into the heart of the organisation and the whole way out on the construction site. If the construction workers do not feel that they are a part of the process, partnering and Lean Construction will not be that beneficial for NCC as it could be.

### **7.1.2 Education, leadership style and leadership behaviour**

As mentioned above, it is important that construction managers are aware of the construction workers' technical knowledge, experiences and ideas, when they are planning the construction process. Not only is it important to involve and use the construction workers' skills and information, it is also important to do it in an efficiently way. No people are the same and people think differently depending on their job function, their social status in the society etc. Consequently, construction managers must develop their own techniques to motivate, and commit construction workers to feel positively about their job as well as the project they are working at.

According to Keys and Case (1990) one way to do so is by having a high level of trust and respect construction workers and managers between. The majority of the interviewed stated that to be trustful, managers must be concerned about appearance of fairness, impressing upon subordinates and a willingness to consider subordinates' views and be even-handed in the decision making. Greenberg (1990) and Hollander and Offermann (1990) found similar results in their research. They claim that managers' personal communication skills, attitude and qualifications as well as the managers' trustfulness and justice are at least as important as his or her organisational position. Leadership is first effective when it motivates subordinates and shows the path to the goal thus it is clear and easy to find. But leadership can be effective in many different ways, as leadership both can be directive, supportive, participative etc.

The majority among researchers (e.g. Johnson and Johnson, 2003; Yukl and Van Fleet, 1992; Lewin et. al., 1939; Vugt et. al., 2003; House, 1996) and the interviewees states that managers using a transformational leadership style compared to a transactional leadership style, managers who use a democratic compared to an autocratic style, or managers who conduct a supportive or participating leadership style compared to a directive leadership style in general are more effective and accepted by their subordinates. Both the interviewees and the researchers argue that it creates a commitment and stimulation when the manager is helping the subordinates to develop new ideas instead of managing them in a directive way. A number of the interviewees expressed that they feel motivated to perform better when their construction manager is trustful and respectful. They further stated that if the construction manager is having such a behaviour and attitude, they automatically work more independent, as they know that they have the necessary support from their manager. Subsequently, they expressed that if the manager is listening and informing them in a proactive way in what, when and how they are going to perform a specific task, they are also more willing to do it within the time schedule. Therefore, the manager must be a person who can influence people in a positive direction, thus they are able to become effective in what concerns working relationships but also regarding achievement of mutual project goals.

Despite these statements, not all researchers and interviewees agree. Fiedler (1978) and Miller et. al. (2004) point out that manager must diagnose its subordinates' personality thus he or she knows what can be expected of the subordinates as well as the tasks the subordinates are set to perform. The manager must be able to and educated in recognising which leadership style subordinates need and ask for and then adapt a suitable leadership style to meet those needs.

Blanchard et. al. (1993) and Avery (2002), both researching in situational based leadership mention that if subordinates are very low in competences, information or motivation, the situational leadership theory prescribes a directive style for the manager and a supportive leadership style if subordinates appear to be competent, have the necessary information and committed to do their job. The same aspect was mentioned by two of the construction managers. They were both expressing that not all construction workers want to take part in the process planning or be proactive during meetings, workshops etc. The two construction managers further mentioned that many construction workers have to be led in a directive way, because of the following: First, construction workers do not have the same theoretical educational level as the construction managers have, and are

therefore often not motivated to actively involve them self and take personal responsibility in the planning and performance process. Second, many construction workers have chosen to be construction workers because they like a physical active job and do not like to have the responsibility, which the construction managers have. These statements are fairly close connected to the statements by Vecchio and Boatwright (2002) as they express the following:

*“The preference for structuring and a directing leadership style would be higher for employees with lower educational level and job functions...leadership suggest that “need for supervision” is a construct, derived from situational attributes, that likely plays a key role in moderating the relationship between manager styles and outcome” and finally “males would express a stronger preference for manager structuring than females”*

Based on my interviews and research I find it relevant that:

- Construction managers putt in some serious effort in decoding which leadership style is most suitable for the construction workers they are leading.
- Build up relationships through mutual respect, trust and effective communication.
- If the construction workers are interested, motivated and committed to take part in the process planning then involve them actively and take use of their knowledge, experiences and ideas. If the construction workers are not interested then keep them sufficiently informed in the outcome of the performance planning as well as the goals of the construction project.

The Danish collaboration program BygLOK and now the integrated concept of partnering, Lean Construction and BygLOK called BygSoL is a large step in the right direction to many of the above mentioned necessary improvements in the construction industry. The question is therefore – how are we going to successfully implement these initiatives and ensure that they are fully implemented at all levels within the organisation. According to construction managers as well as in my opinion, NCC must improve their information and education programs, thus on-site construction managers get better informed and educated within the elements of partnering, Lean Construction and BygLOK, thus they can pass on that information to the construction workers and collaborators. This is not the case today as the majority of the construction managers on the experimental construction

project do not feel sufficient educated and informed about the BygSoL program by NCC Damark's ToP-Center.<sup>10</sup>

The ToP-Center must be more concerned about the education, information level and sharing of the know-how from and with their colleagues working on construction projects. Several construction workers and managers asked for success stories, which they can pass on to the construction workers, thus they can improve their motivation and commitment to the new ideas within the program. If not the construction managers themselves are fully committed to the program, then the construction workers will never be it, as they because of their educational level are even less informed about the theory of Lean Construction, partnering etc. than their managers are.

This process is of course not adding direct value to construction projects, but indirectly it improve the construction process and in that way create value to the benefit of both NCC and its collaborators.

## 7.2 Motivation and job satisfaction among construction workers

### 7.2.1 Motivation in work

Throughout the interviews a number construction workers argued that they feel motivated when they are involved in the process planning. They further expressed that they get encouraged when their construction managers ask them their opinion about different solutions as well as when they are asked to bring up solutions them self. The argumentation was that by knowing what other construction workers are working with, it is easier to understand the bigger puzzle in all processes.

Motivation is closely connected to the "goal theory" which for instance Evans (1970); House (1971) and Johnson & Johnson (2003) have been researching in. They all mean that motivation is different from person to person but that most people get motivated by combining their personal goals with the goals of for instance a project.

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<sup>10</sup> The abbreviation "ToP" stems from "Time and Planning". The ToP Center is a time and planning department which is supporting NCC Danmark's construction division in effective time and process planning.

Challenging tasks give employees the feeling that somebody has trust in you, believe in your skills and find you countable. Bass and Avolio (1994) and Yukl and Van Fleet (1992) present a number of success factors that positively influence the outcome when subordinates have challenging tasks. Özaralli (2002) and Kelloway et. al. (2002) advocate for these statements by stating that managers with transformational behaviours energize and empower their subordinates to act independent, simply by providing them with existing visions for the future and give the subordinates the responsibility to make their own judgements. The interviewees' opinions about having challenging tasks are the same. One construction worker stated that challenging tasks for most people are motivating, as it increases your personal commitment to a specific task, as you want to prove to your manager that you are able to manage the task. Locke (1975) argues that individuals or groups who have challenging, difficult or complex goals or tasks will perform better than individuals or groups with weak goals or tasks. House (1996) is going further, as he states that managers who acts as an achievement-oriented manager, who challenges the construction workers by giving them tasks of high complexity and always seeks continuous improvements will motivate the construction workers to improve their performance.

Far from all employees feel motivated and committed in the same way. The motivation factor among employees is often depending on the employee's education, job function, economical status etc. Because of that NCC should be more aware of how they motivate and commit their employees in the best way. Motivation does not necessary has anything to do with pay rise or economic bonus for good performed job, it can also be the "crew of the month", "success stories" from other similarly construction projects, "displaying of improvements and failures" in a company paper or pin it up local on site, etc.

Segil et. al. (2003) finally claims that if senior management in a large company wants to be successful, they need to create a company where the employees are proud of working at. It can not be done over night, but it is something the management of the company has to create and continuously improve. That statement was confirmed by several construction workers as well as two of the construction managers. They expressed that not only their payment is important for them to be happy in their job but also factors such good colleagues, pension scheme and good functional machineries are very important factors.

### **7.2.2 The necessity of effective collaboration**

Effective collaboration is probably the most important factor for conducting successful business, not only in the construction industry. Despite that, it is relatively rare that collaboration between different parties is as effective as it could be. To create an effective collaboration people between, all parties have to be trustfully and take an active part in that process. If the communication and sharing of information between consultants, construction managers and construction workers is lacking, it will be difficult to effectively implement partnering, Lean Construction and BygLOK into one construction project.

The BygLOK program is in my opinion as well as according to the majority of the interviewees, one tool to create an effective communication and sharing of information between the construction workers and their managers. In order to make the elements within partnering and Lean Construction useful, the ideas within it have to be implemented into construction projects, thus it gets in directly contact with the people who is generating the value for the construction company as well as the client. BygLOK is focussing on involvement of the construction workers in the planning process as well as take use of the construction workers' experiences and knowledge by listening to their ideas about how to perform and solve specific tasks and problems. Further, the tools within Lean Construction is reasonably structured and organised, thus the time schedule can be hold on track and the construction managers can easily sense, whether a certain building activity is going to be "good" or not. As the BygLOK program is focussing on involvement of the construction workers in the entire planning process, it automatically gives them influence, co-responsibility and a feeling of engagement in their own performance process. In that way, the BygLOK program can be an effective bridge between theory and practice.

Both partnering, Lean Construction and BygLOK are contributory factors to a better collaboration on the construction project, but what more can influence and contribute to this effect? Nine out of ten of the interviewees, expressed that by having the same construction workers and construction managers working together on more than a single construction project it would be a large advantage to the benefit of the time schedule, the construction costs and the collaboration of construction workers between but also between construction workers and their managers. It is especially an advantage in the beginning of the project, as they in this phase of the project often spend a lot of time to learn each other's routines, strengths and weaknesses. Similarly, it would be an advantage to

work together with the same subcontractors as often as possible as long as they fit into and respect NCC's values, vision and ideas. Many of the advantages NCC has from its coordinated purchasing strategy can probably with benefit be implemented into the construction projects. This could be done by having construction workers, construction managers and subcontractors, working together for longer periods than just a single construction project. In that way this collaboration could be a win-win solution for the construction project and the persons working on it as well as to NCC and its subcontractors. Simultaneously it would give the different actors better possibilities to make future strategic planning.

## **7.3 Pitfalls and obstacles within partnering, Lean Construction and BygLOK**

### **7.3.1 Value versus waste**

Even though the majority of the interviewees, as well as a large number of researchers, believe that partnering, Lean Construction and BygLOK contain several effective elements to improve the collaboration as well as the processes, some interviewees also expressed concerns about the integrated concept. They were further concerned about the high level of focus NCC is giving the new philosophy, concept and program.

A smaller number of the construction workers and managers, especially the foremen, expressed that they often feel they spend too much time on discussing the same things on different meetings and spend too much time on non-building activities such as weekly planning, sharing of information, workshops etc. The construction workers, who were concerned about the integrated concept, expressed that they find it inexplicable that NCC is putting so much effort into activities such as involvement of the construction workers in the planning process, when they first, are not interested in it and second, do not understand how it can generate extra value for NCC. Some construction managers supplementary experience that they spend too much time and effort in controlling, working out schedules and paradigms etc.

Researchers in partnering and Lean Construction are primarily focussing on the many good elements within partnering and Lean Construction respectively. However, some researchers focus on the lesser good elements within partnering and Lean Construction. Among these researchers are Josephson and Saukkoriipi (2005), who for instance have been researching in sloppiness, waste and

non-value adding activities in constructions. Josephson and Saukkoriipi (2005) argue that as many as 50% of the total construction costs possible can be reduced simply by focussing on the construction company's core business. They also argue that it is possible to minimise non-value adding activities to a minimum by avoiding mistakes and unprofitable activities such as meetings, insurances, material and production waste etc. Their research shows, that approximately 45% of all construction work on a Swedish construction site is categorized as indirect work such as handling of materials and planning, 35% is categorized as interruption in work as well as waiting- and unexploited time and as little as just 20% is categorized as direct work, which directly generates value to the project, the construction company and the client. All the above mentioned figures are related to the workmanship.

Josephson and Saukkoriipi (2005) have in their research documented some of the statements which also were expressed by the interviewed construction workers. Among other things they have documented in their research that up to 10% of the total cost for construction are mistakes. Despite this result, they also found that the construction industry does not necessarily need to change its present production system radically, introduce new processes etc., but rather improve and effective existing activities. By improving the vertical as well as the horizontal collaboration in the construction industry, including the on-site work, and by striving to keep key personal in the company, thus an effective project organisation can be created before the construction project is beginning; elimination of waste and production mistakes is possible.

The construction managers must be more aware of the construction workers' waiting time on materials and tools. Josephson and Saukkoriipi (2005) states that more than 10% of the total construction costs and time spent on construction projects is spent on waiting on materials or machinery. Consequently, it often results in extra planning and controlling activities, which does not create any value to the project. One way to minimise these activities is through a better structure, effective planning from the beginning and a leadership who focuses on informing and involving the construction workers in the entire building process, thus the management can reduce their time spent on controlling and re-planning the process (Bergman & Klefsjö, 2003).

A large number of researchers in Lean Construction suggest different ways to improve and "lean" the construction process. However, it is not the purpose of Lean Construction to lean the

construction process 100%. Firstly, because it is probably not possible and secondly if it is 100% lean, then you must have forgotten something or your goals are too weak. The purpose must therefore always be to strive for improvements, thus waste can be minimised and the construction process can be as lean as possible in the situation. Whether a construction process can be too lean the answer is in my opinion both yes and no. In one way it can never be too lean, but in the other way it can be that lean, that employees, especially mid-level managers are going to oppose the lean process, as they get worried about their own job situation and the changes the lean process is bringing.

### **7.3.2 Process versus product**

Construction managers must to a larger extent see construction projects as a process rather than just focus at the end product. By focussing on the ongoing day-to-day, week-to-week and month-to-month process the end-product will automatically end up with a good and satisfactory result. For that reason, the construction manager must to a greater extent be aware of the daily logistic processes and the collaboration with subcontractors and suppliers. The construction manager must carefully plan each process and focus on the flow, the value stream and perfection in all solutions, thus the process is generating value to the project. By ensuring that materials, machineries and manpower are on-site at the right time as well as minimise non-value adding temporary activities such as scaffolding, shuttering etc., the value stream will automatically be improved. By sharing information and work for better and more standardised process such as prefabrication and mass production, the construction companies can reduce their construction costs and improve quality in work to the benefit of the client and the contractors of the building.

Many initiatives, such as longer and closer collaboration suppliers, contractors and the client together used in the building of standard houses must be utilised better in the rest of the construction industry, as well as the collaboration to end customers (users of the building) must be improved to the benefit for all parties. If the construction company does not meet the client's expectations, the construction company will by time loose the client as a customer – that is one of the cornerstones within the Lean Construction philosophy.

## **8 Conclusions and recommendations**

### **8.1 Conclusions**

The objective of this Master thesis is to study which issues NCC must focus on, thus the philosophy of partnering, the concept of Lean Construction and the Danish collaboration program BygLOK integrated in construction projects will contribute to an efficiency of the company's business? Sub-questions consider (a) which competences and behaviours among construction managers are important, thus an effective integration of partnering, Lean Construction and BygLOK in construction projects is achievable? (b) what must construction workers and especially their managers do to reduce the costs as well as improve the quality and the working environment in construction projects? and (c) which obstacles have to be reduced and processes improved, to the benefit of an effective and deeply rooted integration of partnering, Lean Construction and BygLOK in construction projects?

Based on research and theory I have found that a number of the elements within partnering, Lean Construction as well as BygLOK have a positive impact on several factors in construction projects. The elements within partnering and BygLOK as well as the philosophy of Lean Construction have had a positive influence on the culture within the studied construction project. Because of that it is my conviction that involvement of the construction workers who are interested in taking an active part in the planning process will be of benefit to NCC. The involvement will by time radically reduce the number of mistakes, the number of double- and reconstruction work and the number of accidents among construction workers as well as reduce the entire building period and the total amount of construction costs. The BygLOK program improves the daily collaboration between the construction workers and the managers as well as motivates and commits the construction workers to take a higher co-responsibility in the work they are performing.

The following advantages of partnering, Lean Construction and BygLOK integrated in one construction project have been identified:

- By applying the construction workers ideas, experiences and technical knowledge into the process planning, a reduction of accidents, double- and re-construction work as well as mistakes in the performance process is achievable. These non-value adding factors are

negatively influencing the total construction costs and the time schedule of the construction project.

- The majority of the construction workers and managers, get motivated by knowing that they are doing a difference in their job as well as having insights in not only their own working process. It can be accomplished by having a high level of two-way information construction workers and managers between and by involvement of the construction workers in the process planning. That makes NCC as a better company to work for.
- Motivated, committed and satisfied construction workers and managers are more effective, customer-oriented as well as a more attractive construction company to the benefit of NCC, its customers and its employees. Motivated employees are thinking and performing more effectively and with a higher degree of personal co-responsibility in their work.

Consequently, construction managers must develop their own situation-based leadership style in order to motivate different construction workers in different ways. A supportive, democratic or transformational leadership style is the most suitable for the majority of the construction workers as well as in most situations, as they feel committed to their job and take higher co-responsibility in it. A more directive and transactional leadership style can despite that be suitable in situations where the complexity or the risks in the performance of a specific task is fairly low.

Secondly, construction managers working with partnering, Lean Construction or BygLOK in construction projects must be active in the implementation and development of process of the new ideas within BygSoL and strive for an organisation where the information flow is bottom up as well as bottom down. The collaboration must be based on mutual trust and an interdisciplinary dialog where everybody works for a shared vision and project goals. Doing so, conflicts are not avoidable, but when they occur, they are much easier to quickly and effectively solve.

Despite the in general positive opinion to partnering, Lean Construction and BygLOK among both the interviewees and the researchers, a number of problems has to be minimised before NCC will obtain a satisfying benefit of the integration of partnering, Lean Construction and BygLOK in construction projects.

## 8.2 Recommendations

The following recommendations have been identified to improve the benefit of the integration of partnering, Lean Construction and BygLOK into construction projects.

- Construction managers, working on-site, and the leadership of NCC must be better to decode the motivational needs of their employees. The elements that motivate a construction worker are not necessarily the same which motivate a construction manager. Subsequently, success stories are missing in sufficient quantities.
- The communication and information as well as education from NCC's ToP-Center to the company's construction managers, working on-site, need to be more effective, thorough and direct. That is crucial for the outcome of the on-site working construction managers' success of motivating and committing the construction workers into the new way of thinking and working. The communication between the construction workers and the construction managers must be two-way both horizontal as well as vertical.
- NCC must retain the positive development and focus on their core business by standardisation in construction, coordinated purchasing and a common effective structure of working routines thus waste in the production can be minimised. Second, construction managers must learn to focus more on the building process rather than on the finish building. Despite that it is not recommendable to NCC to develop new handbooks, manuals etc. to promote the integration of partnering, Lean Construction and BygLOK into construction projects.
- NCC should focus more on the longer collaboration with their sub-contractors (strategic partnering) but also on the collaboration between the construction managers working on-site. The synergy, which is generated during a longer period of working together, is lost, when two or more construction managers are going to be separated when the construction project is finish.
- NCC must be better to recognize the good work of their construction workers. They have a larg part in the economical success NCC is obtaining by doing partnering, Lean

Construction and BygLOK. Further construction managers must adapt a leadership styles and behaviour, which is suitable for the situation in as well as the people they are working with.

Finally, the positive process, which is already started, is going in the right direction, but the real benefit of partnering, Lean Construction and BygLOK integrated in construction projects will probably not be discovered within the next years. It is the entire culture within the construction industry which has to be changed. This culture will in my opinion be difficult to change without applying the elements of BygLOK and BygSoL. I found that both programs, especially because of their involvement of the construction workers in the planning process, are the key which can change the culture and the way of thinking of the construction industry.

### **8.3 Further studies**

During this study several areas which are outside of the scope of this study have been discovered. These areas are presented and discussed below and could be interesting in the context of further research and developments.

Since this study is drawn up in cooperation with NCC it would be interesting to investigate whether other construction companies are having the same successes as well as problems with the integration of partnering, Lean Construction and BygLOK into construction projects. Subsequently, it would be interesting to examine whether the obstacles and success factors identified in this study are determined by national cultural factors only existing in Denmark or whether these factors are relevant a cross the boarders as well as a cross the Atlantic?

Supplementary, it is relevant to study how construction managers effectively can locate and decode the construction workers' motivational needs and how NCC keeps the construction workers and managers who have high performance skills? Further, is it practical possible for NCC to reduce the number of supervisors and foremen, if the construction workers are taking a more active part in the planning process in construction projects?

I have in this study argued that NCC must not forget to focus on their core business, but how do the company develop an effective and structured set of working among the construction managers, thus all are working for the same mission, goals and strategy and how can this working set get fully implemented into all the construction managers' working routines?

Finally, I chose to focus on leadership, but other topics and areas in connection to an integrated construction project of partnering, Lean Construction and BygLOK could be interesting to research in. For instance whether there is any double work etc. when some of the ideas within partnering, Lean Construction and BygLOK respectively are the same from.



## **9 Explanation of words**

BygLOK = **L**edelse, **O**rganisations- og **K**ompetenceudvikling i **B**yggeriet  
(*Leadership, Organisation and Competence in Construction*)<sup>11</sup>

BygSoL = **S**amarbejde og **L**æring i **B**yggeriet  
(*Lifelong Learning in Construction*)<sup>12</sup>

Gang(er) = Sjak(bajs)

*Kaizen* = Continuous improvements = Kontinuerlige forbedringer

*Kanban* = ”Card” for delivering = ”Kort” som bruges ved levering af varer

*Muda* = Waste = Spild

PPC = (Percent Performed and Completed work) = Procent Planlagt Udført (PPU)

WPP = (Week, Period and Process plan) = Uge-, Periode- og Procesplan (UPP)

Site/construction manager = Byggeleder

Supervisor/foreman = Arbejdsleder/Formand

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<sup>11</sup> The translation in to English of the abbreviation of BygLOK is made by Elsborg et. al. (2004)

<sup>12</sup> The translation in to English of the abbreviation of BygSoL is made by Elsborg et. al. (2004)



## 10 References

### 10.1 Literature

- Apelgren, S. (2004) *Snublesten I byggeriet*, BYG-DTU, Danmarks Tekniske Universitet, Lyngby, Copenhagen
- Avery, G. C. (2002) *Situational leadership preferences in Australia: congruity, flexibility and effectiveness*, Leadership & Organization Development Journal, Vol. 22, No. 1, pp. 11-21
- Avolio, B. J. and Howell, J. M. (1994) *Improving Organisational Effectiveness through Transformational Leadership*, Academic Press, San Diego, CA.
- Barlow, J., Cohen, M., Jashapara, A. and Simpson, Y. (1997) *Towards Positive Partnering – Revealing the Realities in the Construction Industry*, The Policy Press, UK.
- Bass, B. M. (1985) *Leadership and Performance beyond Expectations*, Free Press, NY.
- Bennet, J. and Jayes, S. (1995) *Trusting the team, The Best Practice Guide to Partnering in Construction*, Centre for Strategic Studies in Construction, The University of Reading, UK.
- Bennet, J. and Jayes, S. (1998) *The seven pillars of partnering – A guide to second generation partnering*, Centre for Strategic Studies in Construction, The University of Reading, UK.
- Bergman, B. and Klefsjö (2003) *Quality – from customer needs to customer satisfaction*, Studentlitteratur, Sweden
- Bertelsen, S. (2002) *Complexity – Construction in a new perspective*, (Presented at the annual conference in the International Group for Lean Construction) Gramado, Brazil
- Bertelsen, S. (2004) *Lean Construction: Where are we and how to proceed?*, Lean Construction Journal, Vol. 1, pp. 46-69
- Bertelsen, S. (2004-2005) *Trimmede Tanker Nyhedsbrev*, Lean Construction - DK
- Bispebjerg Bakke, A project booklet of the integrated experimental project, NCC Danmark A/S
- Bjerg, L. (1999), Center for journalistik og efteruddannelses homepage: <http://www.cfje.dk>
- Blanchard, K. H., Zigarmi, D. and Nelson, R. B. (1993) *Situational leadership after 25 years: a retrospective*, Journal of Leadership, Vol. 1, No. 1, pp. 22-36
- Boverket's homepage: <http://www.boverket.se> (Andersson, I., Forsman, & B.Olsson, K.)
- Bryman, A. (1992) *Charisma and leadership in organizations*, Sage Publications, CA.
- BygSol's homepage: <http://www.bygsol.dk>
- BygSol Nyhedsbrev - *Samarbejde og læring i byggeriet*, Teknologisk Institut, Vol. 1, No. 1-5
- Busk, E. (2003) *Partnering – håndbog for bygherre*, Byggecentrum, Denmark

- Cain, C. T. (2004) *Profitable Partnering for Lean Construction*, Blackwell, UK.  
Construction Excellence's homepage: [www.constructingexcellence.org.uk](http://www.constructingexcellence.org.uk)
- Critchlow, J. (1998) *Making Partnering Work in the Construction Industry*, Chandos Publishing (Oxford) Limited, UK.
- Dam, A. and Elsborg, S. (2003) *Entrepreneurship in the building process – a development and research project*, BygLOK, Denmark
- Den menneskelige faktor, NCC Danmark A/S
- Elsborg, S., Dam, A. and Bertelsen, S. (2004) *BygLOK – A Danish Experiment on Cooperation in Construction*, (Presented at the 12th annual conference in the International Group for Lean Construction) Elsinore, Denmark
- Emiliani, M. L. (1998) *Lean Behaviours*, Management Decision, Vol. 36, No. 9, pp. 615-631
- Emiliani, M. L. (2003) *Linking leaders' beliefs to their behaviours and competencies*, Management Decision, Vol. 41, No. 9, pp. 893-910
- Emsley, D. (2003), *Multiple Goals and Managers' Job-Related Tension and performance*, Journal of Managerial Psychology, Vol. 18, No. 4
- Evans, M. G. (1970) *The effects of supervisory behaviour on the path-goal relationship*, Organisational Behaviour and Human Performance, Vol. 5, pp. 277-298
- Fiedler, F. E. (1978) *Contingency model of leadership effectiveness*, Academic Press, Vol. 11, pp. 106-112
- Før mødet med NCC i Danmark, NCC Danmark A/S
- Greenberg, J. (1990) *Looking fair versus being fair: Managing impressions of organizational justice*, Research in Organisational Behaviour, Vol. 12, pp. 141-157
- Grint, K. (1997) *Leadership – Classical, Contemporary and Critical Approaches*, Oxford University Press, NY.
- Hackman, J. R. and Walton, R. E. (1986) *Leading groups in organizations*, Jossey Bass, San Francisco
- Hellmers, M., Holst-Jensen, N. and Krogh, S. (2004) *Strategisk partnering – byggebranchens fremtidige samarbejdsform!* Aalborg University, Denmark
- Hines, P., Holweg, M. and Rich, N. (2004) *Learning to evolve – A review of contemporary lean thinking*, International Journal of Operations & Production Management, Vol. 24, No. 10, pp. 994-1011

- Hinkin, T. R. and Tracey, J. B. (1999) *The relevance of charisma for transformational leadership in stable organisations*, Journal of Organisational Change Management, Vol. 12, No. 2, pp. 105-119
- Hollander, E. P. and Offermann, L. R. (1990) *Power and leadership in organizations: Relationships in transaction*, American Psychologist, Vol. 45, pp. 179-189
- Holme, I. M. and Solvang, B. K. (1991) *Forskningsmetodik – Om Kvalitativa och Kvantitativa Metoder*, Studentlitteratur, Sweden
- Holt, Knut (1998) *Management and organisation through 100 years*, Technovation, Vol. 19, pp. 135-140
- House, R. J. (1971) *A path-goal theory of leader effectiveness*, Administrative Science Quarterly, Vol. 16, pp. 321-328
- House, R. J. (1996) *Path goal theory of leadership: Lessons, legacy and reformulated theory*, Leadership Quarterly, Vol. 7, No. 3, pp. 323-352
- House, R. J. and Mitchell, R. R. (1974) *Path-goal theory of leadership*, Journal of Contemporary Business, Vol. 3, pp. 81-97
- Howell, G. and Ballard, G. (1998) *Implementing Lean Construction: Understanding and action*, (Presented at the annual conference in the International Group for Lean Construction) Guaruja, Brazil
- Howell, G. and Koskela, L. (2000) *Reforming Project Management - The Role of Lean Construction*, The International Group for Lean Construction", IGLC-8, Brighton, UK.
- International Group for Lean Construction's homepage: <http://cic.vtt.fi/lean>
- Jacobsen, D. I. and Thorsvik, J. (2002) *Hvordan organisationer fungerer – Indføring i organisation og ledelse*, Hans Reitzels Forlag, Copenhagen, Denmark
- Johnson, D. W. and Johnson, F. P. (2003) *Joining Together – Group Theory and Group Skills*, 8<sup>th</sup> Ed., Allyn and Bacon, US.
- Jonsson, P. and Mattsson, S. (2005) *Logistik – Läran om effektiva materialflöden*, Studentlitteratur, Lund, Sweden
- Josephson, P-E. and Saukkoriipi, L. (2005) *Slöseri i Byggprojekt – behov av förändrat synätt*, Chalmers Technical University, Sweden
- Jørgensen, B., Emmitt, S. and Bonke S. (2004) *Reveling cultures and sub-cultures during the implementation of Lean Construction*, (Presented at the 12th annual conference in the International Group for Lean Construction) Elsinore, Denmark

- Kelloway, E. K., Barling, J., Kelley, E., Comtois, J. and Gatien, B. (2002) *Remote transformational leadership*, Leadership & Organization Development Journal, Vol. 24, No. 3, pp. 163-171
- Keys, B. and Case, T. (1990) *How to become an influential manager*, Academy of Management Executive, Vol. 4, No. 4, pp. 38-51
- Kristensen, E. L. and Nielsen, A. S. (2002) *Lean Construction – En redegørelse for det amerikanske produktionskoncept – Lean Construction – udviklet mhp. En effektivisering og reorganisering af byggeprocessen*, Aalborg University, Denmark
- Kubal, M. T. (1994) *Engineered Quality in Construction, Partnering and TQM*, McGraw-Hill, UK.
- Lean Construction – DK's homepage: <http://www.leanconstruction.dk/>
- Lean Construction Institute's homepage: <http://www.leanconstruction.org>
- Lewin, K., Lippitt, R. and White, R. (1939) *Patterns of aggressive behaviour in experimentally created social climates*, Journal of Social Psychology, Vol. 10, pp. 113-125
- Liu, W., Lepak, D.P., Takeuchi, R. and Sims, H. P. (2003) *Matching leadership styles with employment modes: strategic human resource management perspective*, Human Resource Management Review, Vol. 13, pp. 127-152
- Locke, E. A. (1975) *Personal Attitudes and Motivation*, Annual Review of Psychology, Vol. 26, pp. 457-480
- Medspillere – NCC's erfaringer med partnering, NCC Danmark A/S
- Messick, D. M. and Brewer, M. B. (1983) *Solving social dilemmas*, Review of personality and social psychology, Vol. 4, pp. 11-44
- Miller, R. L., Butler, J. and Cosentino, C. J. (2004) *Followership effectiveness: an extension of Fiedler's contingency model*, The Leadership & Organization, Vol. 25, No. 4, pp. 362-368
- Mosley, D., Maes, J., Slagle, M. and Moore, C. (1993) *An analysis and evaluation of a successful partnering project*, Organization Development Journal, Vol. 11, No. 1, pp. 57-66
- Mossholder, K. W., Bennett, N., Kemery, E. R. and Wesolowski, M. A. (1998) *Relationships between Bases of Power and Work Reactions: The Mediatonal Role of Procedural Justice*, Journal of Management, Vol. 24, No. 4, pp. 533-552
- Mullins, L. J. (2002) *Management and Organisational Behaviour*, 6<sup>th</sup> Ed., Prentice Hall, UK.
- NCC Danmarks homepage: <http://www.ncc.dk>
- NCC kommunikationshåndbog, NCC Danmark A/S
- NCC's forretningsetik – Retningslinier for vores adfærd i det daglige arbejde, NCC Danmark A/S
- Northhouse, P. G. (2001) *Leadership – Theory and Practice*, 2<sup>nd</sup> Ed., Sage Publications, US.

- Ohno, T. (1988) *“Toyota Production System”* Productivity Press, Cambridge MA, UK.
- Olsen, P. B. and Pedersen, K. (2003) *Problemorienteret projektarbejde – en værktøjsbog*, 3<sup>rd</sup> Ed., Roskilde universitetsforlag, Denmark
- Orpen, C. (1995) *Employee job performance and relations with superior as moderators of the effect of appraisal goal setting on employee work attitudes*, The International Journal of Career Management, Vol. 7, No. 2, pp. 3-6
- Parker, G. M. (1990) *Team players and teamwork*, Jossey Bass, San Francisco
- Pullin, J. (2005) *Lean Leadership*, Professional Engineering, Vol. 18, No. 14, pp. 31
- Cain, C. T. (2004) *Profitable Partnering for Lean Construction*, Blackwell, UK.
- Remenyi, D., Swartz, E., Money, A. and Williams, B. (1998) *Doing Research in Business and Management - An Introduction to Process and Method*, Sage Publications, UK.
- Richter, A. and Apelgren, S. (2005) *Snublesten koster – Hvordan bygger man uden?*, NCC Danmark A/S and BYG-DTU
- Robertson, P. J. (1994) *The Relationship between Work Setting and Employee Behaviour – A Study of a Critical Linkage in the Organizational Change Process*, Journal of Organizational Change Management, Vol. 7, No. 3, pp. 22-43
- Segil, L., Goldsmith, M. and Belasco, J. (2003) *Partnering – The New Face of Leadership*, AMACOM, NY.
- Teamwork – Sådan får du projektgruppen til at fungere bedre, Teknisk Landsforbund
- The Danish “Erhvervs- og byggestyrelses” homepage: [www.ebst.dk](http://www.ebst.dk)
- Tommelein, I. D. and Weissenberger, M. (1999) *More just-in-time: Location of buffers in structural steel supply and construction processes*, (Presented at the 7<sup>th</sup> annual conference in the International Group for Lean Construction) Berkeley, USA
- Tracey, J. B. and Hinkin, T. R. (1998) *Transformational Leadership or Effective Managerial Practices?* Group and Organisation Management, Vol. 23, No. 3, pp. 220-236
- Tyler, T. R., Rasinski, K. and Spodick, N. (1985) *The influence of voice on satisfaction with leaders: Exploring the meaning of process control*, Journal of Personality and Social Psychology, Vol. 48, pp. 72-81
- Under Hjelmen, Construction nr. 2/2005, NCC Danmark A/S
- Vecchio, R. P. (1997) *Leadership – Understanding the Dynamics of Power and Influence in Organizations*, University of Notre Dame Press, IN.

- Vecchio, R. P. and Boatwright, K. J. (2002) *Preferences for idealized styles of supervision*, The Leadership Quarterly, Vol. 13, pp. 327-342
- Vindberg, M. B. and Hansen, K. H. (2001) *Byg med kommunikation og innovation – et bedre videnmarked*, article 2 ”Læring i byggeriet”, Erhvervs- og byggestyrelsen ([www.ebst.dk](http://www.ebst.dk)), Denmark
- Vroom, V. H. (2003) *Educating managers for decision making and leadership*, Management Decision, Vol. 41, No. 10, pp. 968-978
- Vugt, M. V., Jepson, S. F., Hart, C. M. and Cremer, D. D. (2003) *Autocratic leadership in social dilemmas: A threat to group stability*, Journal of Experimental Social Psychology, Vol. 40, pp. 1-13
- Værdier skaber fremgang – Forvent lidt mere..., NCC Danmark A/S
- Womack, J. P., Jones, D. T. and Roos, D. (1990) *The Machine That Changed The World*, Rawson, US.
- Womack, J. P. & Jones, D. T. (2003) *Lean Thinking – Banish waste and create wealth in your organisation*, Simon & Schuster, UK.
- Yukl, G. A. (1994) *Leadership in Organisations*, 3<sup>rd</sup> Ed., Prentice-Hall Cliffs, NJ.
- Özaralli, N. (2002) *Effects of transformational leadership on empowerment and team effectiveness*, Leadership & Organization Development Journal, Vol. 24, No. 6, pp. 335-344
- Åhlström, P. and Karlsson, C. (1996) *Change processes towards lean production – the role of the management accounting system*, International Journal of Operations & and Production Management, Vol. 16, No. 11, pp. 42-56

## 10.2 Lectures and seminars

Senior lecturer, Bonke, Sten – Technical University of Denmark

(Prof.) Coffey, Michael – University of Greenwich, UK.

(Prof.) Flanagan, Roger – University of Reading, UK.

(Prof.) Josephson, Per-Erik – Chalmers University of Technology, Sweden

(Prof.) Persson, Olle – University of Gothenburg

## Appendices

### Appendix 1

#### Interview

Interviewresultater fra interview af 6 mellemledere den 30-31. maj 2005. Alle de interviewede mellemledere er ansat af NCC Construction Danmark A/S. Hvert interview varede ca. 30 min.

**De interviewedes alder er følgende:** 20-35 år: 4  
35-50 år: 2  
50-65 år: 0

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- 1. Kan du indledningsvis fortælle lidt om dig selv - Hvad er din jobfunktion på pladsen og, hvor mange år har du været i branchen herunder i NCC Construction Danmark A/S mv.?**

Gennemsnit ca. 8 år i byggebranchen deraf i gennemsnit ca. 7 år i NCC Danmark A/S

- 2. Hvilke 3 faktorer er for dig de vigtigste, for at du trives i dit arbejde som mellemleder?**

- <i>Udfordringer og udvikling?</i>	5
- <i>Gode samarbejdspartnere og kollegaer?</i>	4
- <i>Medbestemmelse og ansvar af eget arbejde?</i>	2
- <i>Sjovt at gå på arbejde?</i>	2
- <i>Højere løn?</i>	2
- <i>Gode arbejdsforhold?</i>	1
- <i>Højt informationsniveau fra ledelsen/projektchefen, bygherren og rådgivere mv. (definerbare mål)?</i>	0
- <i>Kompetente håndværkere?</i>	1
- <i>Tidsplaner efterleves?</i>	0
- <i>Faste kollegaer?</i>	0
- <i>Gensidig tillid og samarbejde med håndværkerne?</i>	0

- 3. Er byggepladsen her anderledes end andre byggepladser, som du har arbejdet på? Hvorfor/hvorfor ikke?**

Alle 6 interviewede mellemledere svarede ja. Grundet følgende:

- <b>Kommunikationen er mere direkte:</b>	3
- Større indflydelse i projekteringsløsninger:	1
- For meget spildtid med irrelevante møder mv.:	1
- BygLOK, Lean Construction og partnering er integreret i ét projekt, hvilket bidrager til større forståelse de forskellige aktører i projektet imellem.:	0
	1

**Note:**

**Følgende kommentarer til ovenstående spørgsmål er blevet sagt af en eller flere af de interviewede mellemledere:**

- Samarbejdspartnerne (fagentreprenørerne) er ikke blevet informeret tilstrækkeligt om hvad BygSoL-konceptet indebærer. (flere fagentreprenører vil bl.a. ikke være med på de planlagte fællesmøder, uden at få betaling for den tid de skal afsætte til møderne)
- BygSoL-konceptet er ”gammel vin på nye flasker” Det er et styringsværktøj for folk som ikke selv kan finde ud af at kommunikere, planlægge og styre i forvejen. Man bruger alt for meget tid på noget som ikke tilføje nogen form for værdi til projektet.
- Kick-off møderne er irrelevante. De timelønnede bruger alt for meget tid på noget som de ikke er ansat til. Man burde i stedet koncentrere sig mere om, hvad NCC Construction Danmark A/S lever af, nemlig at bygge boliger mv. For de timelønnede er det alligevel kun lønnen, som tæller. De timelønnede forstår ikke konceptet og de mange nye begreber.
- Introduktionen fra styregruppen (Top-Centret) har været mangelfuld. Hverken mellemledere eller håndværkere har fået tilstrækkelig med information (evt. videreuddannelse) til det nye koncept.
- Det har været meget hårdt at få alle i projektet med de mange nye initiativer og ideer! Det er blevet bedre, men har taget lang tid. Succeshistorier savnes!

**4. Stiller BygSoL projektet større krav til dig som byggeleder, end det gør på en traditionel byggeplads? Eksemplificer!**

<b>Ja meget:</b>	<b>2</b>
Ja men kun lidt:	2
Nej:	2

**Note:**

- Man bruger en del tid på dobbeltarbejde:	<b>2</b>
- Ingen speciel begrundelse:	2
- Det kræver større kontakt med håndværkerne:	1
- Ikke alle er god til denne form for samarbejde:	1

**5. Synes du, at du har den nødvendige viden, efteruddannelse og information til at kunne arbejde optimalt på en byggeplads som denne, hvor nye begreber og filosofier som partnering, BygLOK og Lean Construction anvendes?**

Ja helt sikkert:	1
Delvist ja:	1
<b>Delvist nej:</b>	<b>2</b>
<b>Nej slet ikke:</b>	<b>2</b>

**Note:**

Savner uddannelse i Lean Construction og dets værktøjer:	2
Mangler ikke uddannelse men information om BygSoL-konceptet:	2
Mangler efteruddannelse, men er også forholdsvis nyansat:	1
Efteruddannelse kunne have været relevant og en hjælp:	1

**6. Hvilke ting, under BygSoL-konceptet fungerer godt – har det generelt været en succes?**

Følgende ting fungerer godt: De interviewede har hver nævnt to faktorer.

<b>Lean Construction møderne er relevante:</b>	<b>3</b>
<b>Sikkerhedsmøderne har fungeret rigtig godt:</b>	<b>3</b>
Partnering samarbejdet selvom arkitekterne får for lang snor:	2
Det tætte samarbejde med håndværkerne:	2
BygLOK samarbejdet bliver bedre for hver dag, men fungerer stadig ikke optimalt:	1
”Flagdagene” mv. har været en succes:	1

**7. Hvilke ting, under BygSoL-konceptet, fungerer ikke hensigtsmæssigt?**

- Den fælles kantine har skabt mere splid end gavn Et sæt spilleregler skulle have været aftalt med håndværkerne fra starten af projektet, samt en introduktion til hvorfor de skal spise sammen alle sammen:	1
- Svært at motivere håndværkerne til fællesmøderne:	1
- Kick-off møderne, ”flagdagene” mv. er spild af tid:	1
- BygLOK fungerer ikke efter hensigten endnu:	1
- Kommunikationen fra rådgiverne og til håndværkerne har ikke været tilstrækkelig. Projektgruppen bør være med på BygSoL-møderne:	0
- Sjakbajserne og især arbejdslederne bør være mere engagerede i samarbejdet ved BygSoL møderne, ”flagdagene” mv.:	1

**8. Synes du, at der er noget overlap i de daglige arbejdsprocesser, som skaber konflikter eller dobbeltarbejde, når man både anvender partnering, Lean Construction og BygLOK samtidigt? Eksemplificer!**

<b>Nej (det er nødvendig information på forskellige niveauer):</b>	<b>5</b>
Ja (dobbelt-arbejde for sjakbajser og arbejdsledere):	1

**9. Synes du, at det er en god eller dårlig ide, at inddrage håndværkernes kompetencer og meninger i beslutningsprocessen på en byggeplads? Hvorfor?**

**Ja:**

- **Det skaber engagement, motivation og ansvar samt løser og afklarer mange problemer, før de opstår eller vokser sig større end nødvendigt:** 3

Delvist ja:

- At lytte til håndværkerne og drage nytte af deres respektive kompetence er en god ide, men at de også skal have medindflydelse i beslutningsprocessen er hverken en god ide eller i håndværkernes egen interesse: 1
- For de håndværkere som viser interesse ellers ikke: 1

Nej:

- Håndværkerne siger alligevel ikke noget på fællesmøderne: 1

**10. Ville det være en fordel eller ulempe for dig samt byggeprojektet som helhed, hvis det var de samme byggeledere, håndværkere mv., som du arbejdede sammen med gennem flere projekter?**

**Ja stor fordel:**

- **Kender hinandens svagheder, styrker, rutiner, humør mv.:** 3
- Specielt med UE'erne - både med hensyn til pris og samarbejdet 1

Ja lille fordel:

- Kun de første par uger: 1

Delvist nej:

- Det ville blive for kedeligt og uinspirerende. Man kan nemt blive træt af hinanden, når man arbejder 100% projektorienteret: 1

**11. I hvilken grad føler du ansvar for, at byggeriet bliver en succes i forhold til andre byggeprojekter, som du har arbejdet på – er der nogen forskel? Eksemplificer!**

Man føler større ansvar:

- Partnering og Lean Construction bidrager til bedre arbejdsklima: 1
- Det er en større udfordring at få ikke-tekniske ting til at lykkes: 1

**Hverken eller:** 4

**12. Hvilke initiativer kan NCC Construction Danmark A/S indføre for at optimere effektiviteten på deres byggepladser, uden at håndværkerne føler et større fysisk eller psykisk arbejdspress? Forklar og eksemplificer!**

- **Fokusér på at forbedre produktionsforholdene i stedet for at bruge tid og resurser på for mange møder mv. (NCCs "core-business"):** 2
- Forbedre det interne samarbejde i organisationen. 0
- Mere efteruddannelse samt større ansvar, tillid og respekt (holdninger, sub-optimering samt kommunikation): 1
- Fokuser på kvaliteten af håndværkerne (for mange dårlige): 1
- Tidsplanerne er generelt alt for stramme og urealistiske: 1
- Sjakbajser og arbejdsledere (formænd) skal være bedre uddannet (Lean Construction og BygLOK): 1

**Refleksioner gjort i forbindelse med de 16 interview:**

- Kommunikationen er mere direkte på en BygSoL byggeplads end på en traditionel.
- Efteruddannelse, bedre introduktion samt information til BygSoL-konceptet kunne have været en stor hjælp for mellemlederne.
- Man skal ikke glemme, at NCC Construction Danmark A/S lever af at bygge boliger. Stødtjenester kan nemt blive en stor udgift, hvis de ikke implementeres og planlægges grundigt. (lean thinking)
- Det er generelt samarbejdet med håndværkerne, som ikke fungerer optimalt endnu (BygLOK)
- Det er en stor fordel, at arbejde samme med de samme kollegaer gennem flere projekter. Det skaber synergi, højner effektiviteten samt det interne samarbejds miljø.
- Ikke alle håndværkere har lysten til at blive inddraget i beslutningsprocessen, men dem som har det kan være med til at løse mange problemer før de opstår.

## Appendix 2

### Interview

Interviewresultater fra interview af 16 håndværkere den 30-31. maj 2005. Alle de interviewede håndværkere arbejder som Jord og Beton arbejdere og er alle ansat af NCC Construction Danmark A/S. Hvert interview varede ca. 30 min.

**De interviewedes alder er følgende:**

20-35 år:	5
35-50 år:	9
50-65 år:	2

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**1. Kan du indledningsvis fortælle lidt om dig selv - Hvad er din jobfunktion på pladsen og, hvor mange år har du været i branchen herunder i NCC Construction Danmark A/S mv.?**

Gennemsnit ca. 16 år i byggebranchen deraf i gennemsnit ca. 7 år i NCC Construction Danmark A/S

**2. Hvilke 3 faktorer er for dig de vigtigste, for at du trives i dit arbejde som håndværker?**

- <i>Gode og faste kollegaer?</i>	14
- <i>Tilgængelighed af værktøj, maskiner og materialer?</i>	7
- <i>Højere løn?</i>	6
- <i>Højt informationsniveau fra ledelsen (definerbare mål)?</i>	6
- <i>Gensidig tillid og samarbejde med ledelsen?</i>	5
- <i>Højt sikkerhedsniveau på pladsen?</i>	4
- <i>Medbestemmelse og ansvar af eget arbejde?</i>	3
- <i>Faste rutiner og længerevarende arbejdsopgaver?</i>	0
- <i>Gode arbejdsforhold?</i>	2
- <i>Motivation, respons og belønning af udført arbejde?</i>	0
- <i>Andet? (mødetidspunkter)</i>	1

**3. Er byggepladsen her anderledes end andre byggepladser, som du har arbejdet på? Hvorfor/hvorfor ikke?**

Alle 16 interviewede håndværkere svarede ja. Grunden til dette var følgende:

- <b>Bedre information og kommunikation med byggeledelsen:</b>	<b>5</b>
- Bedre sikkerhed:	3
- For mange møder: (spild af tid)	3
- Mere medindflydelse:	2
- Flere pauser: (negativt)	1
- Fælles kantine: (positivt)	1
- Workshopterne var for barnlige: (spild af tid)	1

**4. Føler du, at arbejdet på pladsen her er mindre eller mere effektivt end andre byggepladser, som du har arbejdet på? Hvorfor?**

Væsentlig mere effektiv:	1
Lidt mere effektiv:	5
<b>Uændret effektivitet:</b>	<b>9</b>
Lidt mindre effektiv:	0
Væsentlig mindre effektiv:	1

**5. I hvilken grad føler du ansvar for, at byggeriet her bliver en succes i forhold til andre byggeprojekter, som du har arbejdet på? Hvordan og hvorfor?**

Væsentligt mere end normalt:	1
<b>Lidt mere end normalt:</b>	<b>9</b>
Uændret:	5
Lidt mindre end normalt: (grundet morgenmøder mv.)	1
Væsentligt mindre end normalt:	0

**6. Synes du, at det er en god eller dårlig ide, at inddrage håndværkernes kompetencer og meninger i beslutningsprocessen på en byggeplads? Hvorfor?**

God ide, at grundet det er motiverende at vide:

- <b>At ledelsen lytter til ens meninger:</b>	<b>8</b>
- <i>Hvad som skal ske</i> de næste par uger:	3
- At ledelsen <i>benytter sig af ens kompetencer:</i>	3

Dårlig ide grundet:

- <i>Spild af tid</i> (det er byggeledelsens opgave at planlægge)	2
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**7. Synes du, at du bliver bedre eller dårligere informeret i det arbejde, som du udfører på byggepladsen her, i forhold til andre byggepladser du har arbejdet på? Hvorfor?**

Væsentligt mere end normalt:	2
<b>Lidt mere end normalt:</b>	<b>9</b>
Uændret:	5
Lidt mindre end normalt:	0
Væsentligt mindre end normalt:	0

**8. Hvor fra får du den information som kræves, for at du kan udføre dit arbejde, og synes du at informationsgangen på nogen måde kan forbedres?**

<b>Sjakkbajsen:</b>	<b>9</b>
Formanden:	4
Byggeledelsen:	1
Kollegerne:	1
Tegninger:	1

**Note:**

- Sjakkbajserne føler sig bedre informeret ved, at de nu deltager i flere møder, end de tidligere har gjort. Omvendt føler de ikke, at formanden kan undværes. Dette skyldes, at sjakkbajserne efter eget udsagn ikke vil have tid til også at arbejde på pladsen, hvis de samtidigt også skal ordne papirer mv. Alle de interviewede sjakkbajser udtalte, at de ikke ønsker at være en del af funktionærstaben!

**9. Har alderen blandt dine kollegaer og ledere betydning for arbejdsklimaet på en byggeplads? Hvorfor og hvordan?**

<b>Ingen betydning:</b>	<b>8</b>
Positiv betydning med kollegaer på samme aldersniveau:	5
Positiv betydning med både yngre og ældre kollegaer:	3

**Note:**

- De ældre håndværkere synes til tider, at deres yngre kollegaers manglende erfaring kan være til ulempe i det daglige arbejde.
- De yngre håndværkere synes omvendt, at deres ældre kollegaer holder sig meget isoleret, specielt i pauserne, samt at de ikke er så åbne for nye ideer, metoder og holdninger.

**10. Ville det være en fordel eller ulempe for dig samt byggeprojektet som helhed, hvis det var de samme byggeledere, håndværkere mv., som du arbejdede sammen med gennem flere projekter?**

Stor fordel:	5
<b>Lille fordel:</b>	<b>9</b>
Ingen fordel:	1
Lille ulempe:	1
Stor ulempe:	0

**Note:**

**De interviewede håndværkere, som syntes at det ville være en fordel, begrundede det med:**

- Det ville være tidsbesparende, specielt i begyndelsen af et projekt. Man kan fortsætte hvor man slap ved sidste projekt.
- Det giver synergieffekt, eftersom man med tiden kender hinandens styrker og svagheder.
- Arbejdsgangen bliver mere systematiseret og organiseret, hvilket skaber mere harmoni.

**Omvendt udtalte en enkelt interviewet håndværker at:**

- Det ville gøre arbejdet alt for kedeligt, ensformigt og uninspirerende

**11. Hvilke initiativer kan NCC Construction Danmark A/S indføre for at optimere effektiviteten på deres byggepladser uden at håndværkerne føler et større fysisk eller psykisk arbejdspress? Forklar og eksemplificer!**

<b>Mere i løn (samme niveau som Skanska, MT Højgaard etc.)</b>	<b>4</b>
Ingen ting (jeg er generelt godt tilfreds):	3
Flere sociale arrangementer som funktionærerne har det:	2
Kommunikationsgangen til ledelsen skal forkortes:	2
For stor udskiftning af ansatte:	2
Afskaf accordarbejdet:	1
Bedre sikring af, at man ikke altid mangler nødvendigt værktøj:	1
Flere "kick-off" meetings etc.	1

**Refleksioner gjort i forbindelse med de 16 interview:**

- BygSoL konceptet er generelt en god ide, men er noget som tager tid, og som ikke skal trækkes ned over hovedet på håndværkerne fra den ene dag til den anden. Det er hel ny måde at arbejde sammen på og en arbejdskultur som radikalt skal ændres!
- Implementeringen, integreringen og forankringen af fx BygSoL konceptet skal ske gennem kontinuerlig information og kommunikation af mål, værdier og visionen bag konceptet.
- Troværdige kollegaer, sikre arbejdsforhold og fast arbejde er nøglefaktorer for mange håndværkere.
- Det at føle sig respekteret, og at man kan have tillid til ledelsen er vigtigt.
- De fleste håndværkere går primært op i deres "arbejde", altså det som de er ansat til. For mange nye ideer samtidigt gør mange håndværkere usikre, irriterede, og de føler, at det er spild af tid. Flere føler det som om, at det at bygge tilsyneladende ikke længere er det vigtigste for NCC Construction Danmark A/S.
- Det vigtigste for mange håndværkere er at det værktøj, de maskiner samt de materialer, som de skal benytte er til stede, når de skal anvende dem.



## Appendix 3

### Evaluering af BygSoL på Bispebjerg Bakke

Byggepladsen: **Bispebjerg Bakke** er med i projektet BygSoL. Aktiviteterne på pladsen er:

- BygSoL introduktionsmøde
- Opstartsseminar
- BygSoL møder på byggepladsen undervejs

Vi vil bede dig besvare de følgende spørgsmål med udgangspunkt i dine erfaringer med at arbejde på **Bispebjerg Bakke**

Dette spørgeskema er udformet, så det kan besvares på 10-15 minutter. Giv dig god tid!

Skemaet skal bruges i evaluering af de aktiviteter, der har været i BygSoL projektet.

Dine svar er anonyme og behandles af Teknologisk Institut

#### 1. Er du enig i følgende.....?

##### 1.1 Det har været bedre at arbejde på Bispebjerg Bakke sammenlignet med tidligere byggepladser

- Meget enig 1
- Enig 3
- Hverken eller 4
- Uenig
- Meget Uenig

#### Spørgsmål om kommunikation og samarbejde på byggepladsen Bispebjerg Bakke

##### 2. Er du enig i følgende.....?

##### 2.1 Samarbejdet i sjakket fungerer bedre end på tidligere pladser

- Meget enig 1
- Enig 2
- Hverken eller 5
- Uenig
- Meget Uenig

##### 2.2 Samarbejdet mellem sjakkene fungerer bedre end på tidligere pladser

- Meget enig 1
- Enig 1
- Hverken eller 6
- Uenig
- Meget Uenig

2.3 Samarbejdet **med byggeledelsen** fungerer bedre end på tidligere pladser

- Meget enig 1
- Enig** 6
- Hverken eller 1
- Uenig
- Meget Uenig

2.4 Åbenheden **overfor kolleger** er større end på tidligere pladser

- Meget enig
- Enig** 6
- Hverken eller 2
- Uenig
- Meget Uenig

2.5 Åbenheden **overfor ledere** er større end på tidligere pladser

- Meget enig
- Enig** 5
- Hverken eller 3
- Uenig
- Meget Uenig

2.6 Ansvarligheden **overfor opgaverne** er større end på tidligere pladser

- Meget enig
- Enig 2
- Hverken eller** 6
- Uenig
- Meget Uenig

### Spørgsmål om brug af din viden

#### 3. Er du enig i følgende....?

3.1 Jeg har været mere med i beslutninger om arbejdets tilrettelæggelse end tidligere

- Meget enig 1
- Enig 2
- Hverken eller** 5
- Uenig
- Meget Uenig

3.2 Ledelsen på byggepladsen har gjort mere brug af min viden end tidligere

- Meget enig 1
- Enig
- Hverken eller** 6
- Uenig 1
- Meget Uenig

3.3 Jeg har oplevet et bedre overblik over opgaverne end tidligere

- Meget enig
- Enig 2
- Hverken eller** 4
- Uenig 2
- Meget Uenig

### Spørgsmål om udbytte og udvikling

#### 4. I hvilken grad....?

4.1 Har du oplevet at der er **blevet fulgt op på målene** fra opstartsseminaret?

- I meget høj grad
- I høj grad 1
- I nogen grad** 3
- I begrænset grad 2
- Slet ikke 1

4.2 Er du tilfreds med **din egen indsats** i BygSoL aktiviteterne

- I meget høj grad 1
- I høj grad** 3
- I nogen grad** 3
- I begrænset grad 1
- Slet ikke

4.3 Mener du at **indholdet på BygSoL-møderne er relevant** I meget høj grad

- I høj grad 2
- I nogen grad** 4
- I begrænset grad 2
- Slet ikke

#### 5. Er du enig i følgende....?

5.1 Jeg har fået **erfaringer på denne byggeplads** som jeg kan bruge på andre byggepladser

- Meget enig 1
- Enig** 6
- Hverken eller 1
- Uenig
- Meget Uenig

5.2 **Mødelederne fra Teknisk Skole** har været godt forberedt til BygSoL-aktiviteterne

- Meget enig 2
- Enig** 4
- Hverken eller 2
- Uenig
- Meget Uenig

5.3 Min deltagelse i BygSoL aktiviteterne har sat tanker i gang, som **har været udbytterige for arbejdet på denne byggeplads.**

- Meget enig
- Enig 3
- Hverken eller 5**
- Uenig
- Meget Uenig

5.4 Min deltagelse i BygSoL aktiviteterne har sat tanker i gang, som **rækker ud over mit daglige arbejde.**

- Meget enig 1
- Enig 1
- Hverken eller 6**
- Uenig
- Meget Uenig

5.5 Løsningen med **fælles skur på denne byggeplads er bedre** end de byggepladser, hvor sjakkene har deres egne skure

- Meget enig 1
- Enig 4**
- Hverken eller 2
- Uenig 1
- Meget Uenig

## Spørgsmål om sikkerhed

6. Er du enig i følgende....?

6.1 Der har været **en bedre sikkerhed** på denne plads end på tidligere

- Meget enig 2
- Enig 5**
- Hverken eller
- Uenig 1
- Meget Uenig

6.2 **Ledelsen har været mere opmærksom** på sikkerhed på denne plads end på tidligere

- Meget enig 3**
- Enig 2
- Hverken eller 2
- Uenig
- Meget Uenig

6.3 **Jeg har selv taget større ansvar** for sikkerheden end tidligere

- Meget enig 1
- Enig 4**
- Hverken eller 2
- Uenig 1
- Meget Uenig

6.4 **Kollegerne har taget et større ansvar** for sikkerheden på denne plads

- Meget enig
- Enig** 7
- Hverken eller 1
- Uenig
- Meget Uenig

6.5 Organiseringen af **sikkerhedsarbejdet har fungeret bedre** på denne plads end tidligere

- Meget enig
- Enig** 5
- Hverken eller 3
- Uenig
- Meget Uenig

**Spørgsmål om effektivitet**

7. Er du enig i følgende....?

7.1 Der har været **mindre spildtid** på denne plads end tidligere

- Meget enig
- Enig
- Hverken eller** 8
- Uenig
- Meget Uenig

7.2 Vi har været **i stand til at arbejde mere effektivt** på denne plads end tidligere

- Meget enig
- Enig
- Hverken eller** 7
- Uenig
- Meget Uenig
- Ved ikke / ikke relevant 1

## Baggrundsspørgsmål

### 8. Din alder?

- 29 år 5
- 30-39 år 1
- 40-49 år 2
- 50-59
- 60år eller derover

### 9. Dit køn?

- Kvinde
- Mand 8

### 10. Skolebaggrund?

- Folkeskole 8.-9. klasse
- Folkeskole 9.- 10. klasse 7
- Gymnasium/HF/HTX 1

### 11. Uddannelse?

- Ufaglært 1
- Faglært / tillært 6
- Kortere videregående uddannelse (fx byggetekniker)
- Mellemlang videregående uddannelse (fx konstruktør) 1
- Lang videregående uddannelse (fx civilingeniør)

### 12. I hvilken virksomhed er du ansat?

- Total- eller hovedentreprenør
- Bygherre 2
- Fagentreprenør 5
- Rådgiver eller andre 1

### 13. Jeg har deltaget i følgende antal BygSoL aktiviteter (der må gerne sættes flere krydser)?

- Introduktionsmøde 3
- Opstartsseminar 2
- 1 Byggepladsmøde 2
- 2-5 Byggepladsmøder
- Flere end 5 Byggepladsmøder 5

Tak for hjælpen!