PROJECT MANAGER'S WORK IN TURNKEY CONTRACTS

Research about challenges facing Project Managers in Denmark

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MASTER THESIS

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Synopsis

This report evolves around the Project Manager's work through the performance of Turnkey Contracts. The research paper has been realised by a group of two students as the Master Dissertation in M. Sc. in Management in the Building Industry, at Aalborg University.

The purpose of this study was to analyse and describe the differences between the Main and Turnkey Contract, management wise and to present the most important assets a good Project Manager should have in order to accomplish a project's success and effectiveness.

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Summary

The idea of performing such report occurred to the authors because of the instability and inefficiency of the on-going Danish construction market, through the eyes of the Project Manager. This happens because of so many shifts in trends taking place through the years (1950-present) and specially year 2001, which was crucial for the industry including changes within the sector and the contractors themselves. All these fluctuations had substantial impact on the Main Contractor organisation, leading to the inception for the Turnkey Contract. In the same time, the Project Manager's responsibilities and liabilities increased depending on the contract in cause.

These historical events guided the authors to the further investigation of the Project Manager's work in Turnkey Contracts. Two of the most used types of contract have been chosen in order to create the comparison between the advantages and disadvantages those the most common contract set-up in the industry. Moreover, those were analysed in order to specify which one brings more value for the client and management- wise. The role of the Project Manager under both setups was also investigated in order to institute the universal features of a good Project Manager and to establish the role of the Project Manager in the project success.

After hours of investigation and brainstorming, the authors used data from several articles and case studies in order to validate and filter the information proposed for the creation of this paper. In order to be able to fulfil the proposed goal, namely, to answer to the question What makes a good Project Manager in Turnkey contract? most of the research was required, because there was not enough reliable data created before. The idea of the authors was to collect the necessary information from the interview from six companies, but because of the language barrier and lack of time, only two companies (TL BYG and NCC) replied to our request.

Nonetheless, the optimal characteristics for the good Project Manager in Turnkey Contract and whether the good manager of the project is a guarantee of the project success and what the phase 'project success' actually stands for were spelt out based on the descriptive research, common knowledge and interview answers within the limitation frame.

Acronyms list:

BO- Building owner

CHM- Change Management

GC89- General Provision for technical advice and assistance 1989

GC92- General conditions for work and services in the construction business 1992

GC93- General conditions of turkey contractor 1993

MC- Main Contractor

PM- Project Manager

PPC- Public- Private Corporation

PPP- Public- Private Partnership

PRM- Project Management

SM- Site Manager

TKC- Turnkey Contractor

Enterprise=Project

1. INTRODUCTION

The intention of the report is to investigate the work of the Project Manager in Main and Turnkey Contract. Due to the fact that different type of contract set ups have different management principles, the role of Project Manager varies in tasks and responsibilities. Therefore, the authors describe the most common contract arrangements in order to understand where those differences come from.

Since the execution of the profession is different under each contract set-up it is logical that the characteristics of the good project manager follow the same principle. Therefore, the authors attempt to investigate the required set of skills of Project Managers under different contract arrangements.

The dissertation starts with the background description, which contains information about the past of Danish Building Industry and current situation of the market. The authors find this information relevant to the study because it provides with the idea for why requirements have been changed over the years and how did it influence the current project execution management- wise.

The next part of the report is related to the typical administration of the project. It contains information about the most influential parties of the projects, typical phases and agreements that apply when setting up the contract. The last part of the chapter is dedicated to rules of tender procedure in Denmark and UE in public and private cases.

After the basic universal principles, rules of the most common in Denmark contract setups are described showing advantages and disadvantages of each.

The thorough explanation of differences between construction contract setups is followed by introducing basic principles of project management and change management. Subsequently, the role of the Project Managers and their input in project execution under each contract set up is explained.

Thereafter, there is a part of the report, which relates to the performance of the project manager. It is explained in there what the success of the project is and what the PM's role into achieving it. Moreover, it lists the features that the Project Manager should have in order to be successful when executing project under any type of the contract

The last part of this dissertation includes the ideas for further discussion related to the investigations of the Project Manager's work in Turnkey Contract. The authors were limited in resources and time, therefore thoughts included in this chapter were not further elaborated on in this thesis.

1.1. Research design

Research design refers to the perfect framework and pathway that in this paper contains the method of the research, the problem statement and the research questions. *"The function of research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible."* (De Vaus, 2001, p. 9)

The research starts with the problem statement that is chosen by the authors after many hours of analysing personal wishes and market trends of the Danish construction industry.

Problem statement:

Project manager's work in Turnkey Contracts.

After the final decision of the statement is taken, then the brainstorming for the research questions starts. Depending on types or questions chosen to be more relevant to the problem statement in the case, the research can be either descriptive ('what') or explanatory ('why'). (Stuart MacDonald & Nicola Headlam, n.d.; De Vaus, 2001; Bryman, 2012)

Research questions:

- ***What are differences between the organization of Main Contract and Turnkey Contract management- wise?***
    - What are the characteristics of both contracts?
    - What processes happen in both cases?
    - What are the skills required for managing both contracts?
- ***What makes a good project manager in Turnkey Contract?***
    - What makes a good project manager in Turnkey Contract due to various literature sources?
    - What are the characteristics of a good Turnkey Contractor in real companies' opinion?
    - What are the results of the comparison between the theoretical ideal project manager and the one that companies desire?

As observed, there are two main questions, both highlighting the Turnkey Contract status and starting with 'what', meaning that the research is descriptive. This does not only mean that the report contains a lot of description, but also the fact that for any type of research you need the good and fundamental description in the inception stage. Moreover, the description research is shaped within the frames of this report, focusing on the two mentioned above research questions. (Bryman, 2012; Stuart MacDonald & Nicola Headlam, n.d.)

The next step is to decide upon *what type of evidence is needed to answer the statement in a convincing way?* (De Vaus, 2001)This can be done either by using quantitative or qualitative data. As the name states it, the first one refers to the amount of the information that can be collected, either by surveys or experiments, which are usually evaluated based on the qualitative methods. Another way is to focus on the quality of the gathered data, by performing interviews or using case studies and this is exactly what was relevant and used for the report. (Stuart MacDonald & Nicola Headlam, n.d.; De Vaus, 2001)

What evidence do we need to collect? (De Vaus, 2001) The core was to use as many case studies as possible in order to filter the information by seeking for *plausible rival hypothesis*

and looking for evidence that *disapproves the information in cause.* (De Vaus, 2001)These are the main reasons for the data selection of this paper and as the reference list shows it, there are used numerous current relevant articles with specific case studies. Some of the theoretical sources are relatively old, however the reliability of them in reference to current market situation is proven either by similar statements in more recent sources or data collected from the interviews. There should be also mentioned that it is impossible to check everything, but keeping in mind the reliability (consistency and stability of measuring a concept) and validity (if a concept can be really measured of not) principles, the filtering process was straightforwardly developed. (Bryman, 2012)

Source criticism:

The sources for references and citations used in his paper are according to the Harvard method.

The source is written as follows (source, year) and in some cases the pages no. is also included and for direct quotations are used quotations marks (“”). Most of the figures and calculations presented in this paper contain references to the Appendix and Annex in the end of this paper or on CD.

1.2. Research methodology

The literature used in this paper was found by the authors using the University Library resources. Authors of the paper made an attempt of narrowing down the search of the sources by typing more and more particular headings into library’s base. In order to ensure validity, authors quit on analyzing some of the types of sources available in the library, such as newspapers articles, scores, audio visual and ‘others’.

The first research question refers to contract types in Denmark. The typing order and the results are presented in table below.

Order	Typed words	Results
1	Contract type	36,708
2	Construction contract type	1,163
3	Construction contract type Denmark	8
4	Construction contracts	81,991
5	Construction contract types	809
6	Construction contract types Denmark	13

The sources available in search number 3 and 6 did not cover the answer to research question, which is why authors also filtered the sources shown during fifth search.

The second research question is about project manager. The search sequence is showed below:

Order	Typed words	Results
1	Project manager	158,159
2	Project manager construction	10,313
3	Good Project manager construction	353
4	Good Project manager construction Denmark	0
5	Good Project manager construction Turnkey	1
6	Project manager construction Denmark	144
7	Project manager construction Denmark turnkey	0

Answering the question of *What makes a good project manager?* is done by combining the results of third and sixth search. However, as visible in the table, there is no literature available to specify that is a good project manager in Turnkey Contracts. For this reason, interviewing the companies is essential for answering this question. The interview questions were prepared by using Kvale's seven stages (thematising, designing, interviewing, transcribing, analysing, verifying and reporting) of an interview investigation as much as possible (Steinar Kvale, 1996) even if the interviews were conducted by email and not face to face.

Interviews development:

- 6 companies contacted
- Over 50 mails sent
- Lack of the success – managers not able to help because of lack of time or language barrier
- Two email responds for asked questions by email, incorporated in report findings, attached in appendix.

1.3. Limitations

During the process of work on this report, the authors encountered some obstacles, which were the barriers in realisation of some parts of the report to some extent. Additionally, the timeframe proposed for this paper had to fit with the potential content that can be made. The limitations, which formed the framework of the report, are:

- Change management is presented only as concept without going into detail with strategies and any further analysis.
- Strategies of construction companies and their impact on PM's work are not included because Project Manager has no influence on the chosen strategy.
- Risk management is not included, because enumerating the methods of it does not have any value towards evaluating PM's work.
- According to the library search engine, there was found only one article about the project managers responsibilities within Turnkey Contract and not that much relevant information about the project manager's tasks in Main Contracts, so most of the information is collected from the interviews.
- The authors decided to use the most common three contract setups for Denmark: Trade-by-Trade, Main Contract and Turnkey Contract. Additionally, the agreed documents upon contracts are chosen in the same way.
- Denmark or Nordic/ Scandinavian countries were used as filters for the findings and the case studies used in this paper.
- Law applications from tender proceedings chapters is referring only to the most general aspects regarding DK and UE rules of private and public construction projects.
- BIM (Building Information Model) concept is not included in this paper because it is not the project manager's responsibility of deciding upon that. He/she is more focused on the process of creating a feasible collaboration between the parties involved in a project no matter what kind of information platform is used.

To sum up all the essential information regarding the research design, the data used for the report is based on descriptive research using qualitative methods and filtering the information by using the validity and reliability of the articles/ case studies including, experience and

education of the authors, published year and the countries the case study was based on. Out of the six companies chosen as the base of the interviews, only two answered, so the authors tried to fit the responses in a harmonized and logical way to the content of the report.

1.4. Acknowledgements

The authors of this paper want to express their gratitude firstly, to Lene Faber Ussing, our ideal supervisor with a lot of experience in the field, as well as Anne-Marie Herforth, our accurate law teacher from the second semester, for their time and collaboration. They provided us with useful guidance and valuable comments regarding the material required to perform this report, through the several meetings and emails.

In addition, the authors thank the project managers from the companies, which answered to the interview-emails, Casper Bach Munkholm (TL BYG), and Lars Ørvad Nielsen (NCC) for their time and important information regarding the research questions used for emphasizing the descriptive investigation of the Project Manager's work in Turnkey Contracts.

2. BACKGROUND DESCRIPTION

This chapter is presented as an introduction to the impact factors for the Danish Building Industry, in order to highlight the reason for the present situation of the construction field. The meaning of a project, including the activities/ services comprised, are also stated for affirming the most common projects that are used nowadays leading to the current vision of the Danish construction market. What's more, the comparison including the differential aspects between the public and private funding for building projects is an essential aspect that can totally change the game rules when it comes to the enforcing laws applicable for Denmark or EU. Additionally, based on two sources, six of the most relevant companies, which were planned to be interviewed for the purpose of this report, have been analysed and the information received from two of them is used for emphasising the data included in this paper.

2.1. The past of Danish Building Industry

In order to understand the current organization of contracts within Danish Building Industry it is necessary to establish from where certain arrangements come from. For that reason, this chapter describes the most crucial events influencing the industry that happened in the past.

The construction market started going through some serious changes in the 1950s and 1960s. This situation was influenced by the political demand for cheaper housing. (Kristiansen, et al., 2005) In that time the most traditional material to build from was brick, however such construction is time consuming and demands skilled labour, which was a serious concern. For that reason, in 1947, The Danish Building Research Institute was established and in further years, architects together with engineers discussed possible improvements in construction sector. After many experiments the new ways of execution were introduced, which included concrete walls and prefabricated elements. Those innovations influenced the housing market rapidly and improved its situation for the next decade increasing the number of project in progress and decreasing the necessary man- hours per square meter. In 1970s, however, the situation changed again because the need for more complex industrial buildings appeared. Since then, concrete prefabrication developed into massive production, recruiting more people, limiting the design options in the same time, which led to international criticism of Danish Building Industry around 1990s. (Kristiansen, et al., 2005)

The comparison between similar projects held in 1969 and 1986 gave a clear understanding that the new execution methods need a lot of improvement. The experiment was done and the results were published by the Danish Building Development Council. The conclusion was that the man- hours, which initially were supposed to decrease in fact increased over years, meaning that the management of the construction was not done properly. (Kristiansen, et al., 2005) For that reason, the next report, published in 1993, included a plan for improvements within productivity and quality sector, so that the Danish construction industry can compete internationally. The report suggested that:

- *"the industry had to focus more on refurbishment and renovation of the existing building stock;*
- *more effort should be made to develop inter-firm collaboration; and*
- *improvements needed to be made in both the building product and the building processes."* (Kristiansen, et al., 2005, p. 503)

After the report was published there were three development plans introduced, covering the increase in use of prefabricated elements, closer monitoring of the execution and project management using Lean Construction principles (Bertelsen, 2012) and forming groups that would come up with ideas for innovations. This movement created a great basis for modernization of the building industry, leading to digitalization, modular buildings etc. (Kristiansen, et al., 2005)

The report published in 1997 stated that Danish market requires houses and a mass production product, meaning that there was a need for higher productivity in a high standard of the quality. It was the first time when the high need for the IT influence in the sector was highlighted. In the report, there was also the suggestion that *"the tendering should support integration and that clients should be able to drive future improvements through their demands."* (Kristiansen, et al., 2005)

In 2000, the Danish building sector was criticized again by the Ministry of the Industry, stating that the new building system did not meet the requirements of the market price and quality-wise. It was also stated in the report that the entire building sector does not improve, because even though the methods of work changed, the thinking behind remained old- fashioned. The blame was on lack of competences for managing new systems and no change within trade agreements. (Kristiansen, et al., 2005; Bertelsen, 2012)

2001 was a crucial year for the sector. Changes introduced at this time were driven by the political switch in Denmark. *"The new government closed the Ministry of Housing and Urban Affairs and its responsibilities were included in the Ministry of Trade and Industry"* (Kristiansen, et al., 2005, p. 504) This event did not have a rapid influence on the sector but it started the improvement gradually by implementing certain projects that were included in the master plan. The most important ones include:

- Forming public- private partnerships (PPP) (the concept is explained further in this work in chapter 3.3.1Partnering- contract set up) and taking on Building Operate Transfer projects (BOT[1])
- Formation of the Evaluation Centre (still in progress). The initiative is supposed to be able to estimate the success rate of the projects based on the benchmarking method.
- Digitalization of the whole building process- introduction of BIM (Bertelsen, 2012)
- Support on the research conducted over the construction industry in order to seek for the improvement opportunities. (Kristiansen, et al., 2005)

The reports presented above presented the critical point of view for the industry, being a reason for the changes within the sector and the contractors themselves. Research conducted by Statistics Denmark (Denmark, 2015) shows that there is a significant decrease in profit gained by medium size contactors. Over seven years (1992- 1999) the drop of the total turnover was 24%, pushing the firms into finding the solution for the problem. In order to gain the competitive

[1] "A frequent form of PPP is the build–operate–transfer (BOT) concession under which the private sector builds and operates an infrastructure project for a well-defined concession period and then transfers it to public authorities. The attractiveness of BOT concessions to governments and politicians stems from the possibility to limit government spending by shifting investment costs to private interests" *(Emmanuelle Auriola, 2011)*

advantage, larger contractors started collaborating with subcontractors such as installation or carpentry firms, so they could provide more complex services for lower price. By such cooperation, the contractors gained in size and, as follows, they overcame the competition and started controlling the market. (Kristiansen, et al., 2005; Bertelsen, 2012)

Naturally, the position of small contractors in the industry had to adjust. It did not take long for those firms to realize that they have no chance in competing with large contractors in getting the lead role considering normal contracting, so that they decided to work alongside instead of competing, (Kristiansen, et al., 2005) Additionally, sub-contractors also had to reform their services in order to meet the demands of large contractors. Their work was supposed to contain not only the production and delivery of the product, but also the installation of it, meaning that they became the specialists in certain parts of the construction sector. (Kristiansen, et al., 2005).

All the processes presented above created a great basis for the Main Contract organisation. However, the reformation of the market requirements lead to the necessity of creation of Turnkey Contract. (Schaan & Navarre, 1987) Differences between types of contracts available in Danish Building Industry are described further in this work in Chapter 4 PROJECT TYPES.

2.2. Projects development in Danish Industry

Projects in construction industry are being established for numerous purposes, expecting a variety of outcomes. From a common point of view, both buildings and infrastructure projects are understood as construction projects, even though procedures are obviously different. The Fig. 2.2-1 shows activities held by parties in construction industry (it happens that some companies, especially big ones such as contractors, are able to perform more than one of those activities, however it is a possibility that a single party is responsible only for one of those) and products that can be achieved by the combination of those activities. (Windapo, 2013)

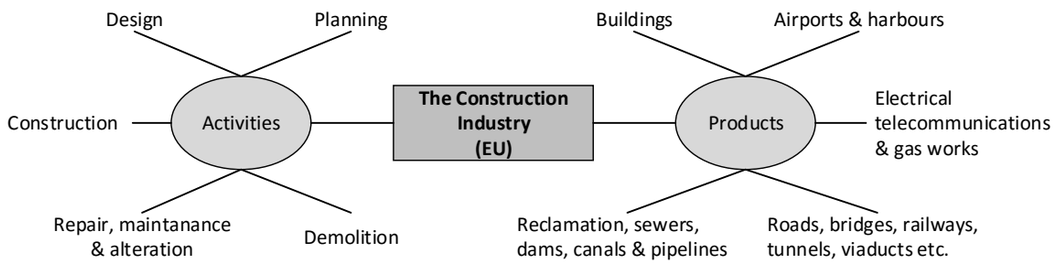

Fig. 2.2-1 Activities and products/ services found in the construction industry (Windapo, 2013, p. 90; Radosavljevic & Bennett, 2012)

Usual division of responsibilities regarding the design is that architects take care of the design of buildings and engineers design infrastructure. However, the professional opinion of the engineer is requested in case of designing buildings, and the architects are often included in design team of infrastructure. (Windapo, 2013; Radosavljevic & Bennett, 2012) This occurs because both parties have different knowledge that contribute to the overall picture of the project.

Based on the report performed by Deloitte[2], *Analysis of the Danish construction industry (2013)* (Annex 05.), the building sector in Denmark is delimitated by various framework conditions that can be observed in Fig. 2.2-2 and only a part of them, which are relevant for the purpose of this paper, are further described.

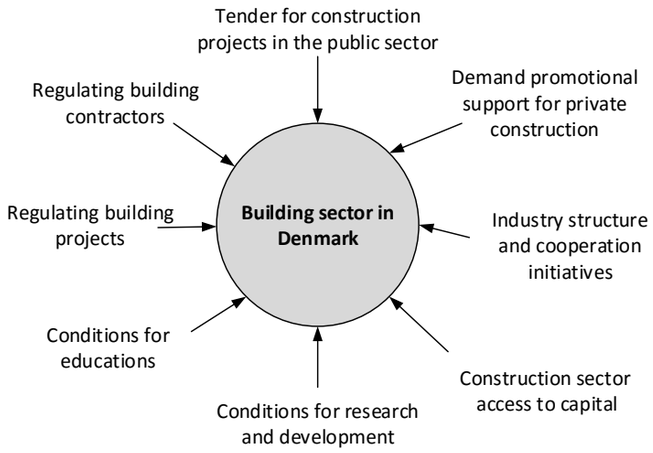

Fig. 2.2-2: Framework of building sector in Denmark (Deloitte, 2013)

The public sector involvement in the building projects can help initiate the use of new techniques, tender types and forms of cooperation. However, based on the interviews from the report (Deloitte, 2013) it is stated that the public sector is usually focused on avoiding the mistakes and tries to maintain the traditional process, this being the reason why Denmark had a later approach for public funding for construction projects compared to other countries in EU such as Germany, Sweden and the Netherlands. (Chapter 3.3.1 Partnering- contract set up)

The industry structure factor it is divided into value chains, which usually cooperate in either short-term or long-term partnerships in construction projects. Although, the construction industry access to capital is limited to some extend in Denmark because of high requirements of security and this can be a problem compared to other countries in EU.

Conditions for research and development are essential for the building capacity to improve productivity through more efficient production methods or the development of new products. Some of the improvement opportunities include increased communication and encouragement of its participation in research and development for long-term partnerships. (Deloitte, 2013)

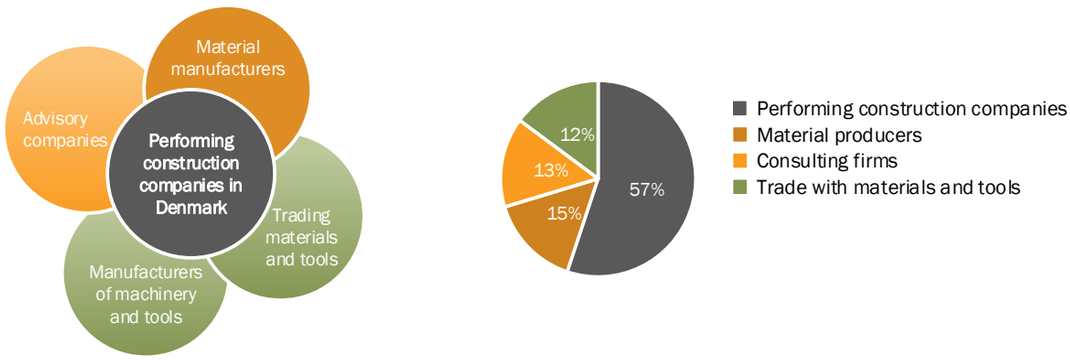

Fig. 2.2-3: Main parties in the building sector (Deloitte, 2013)

The terms of education are also important for building corporate costs for business operations including their power of innovation and productivity. According to the report (Deloitte, 2013) in the recent years, the level of education stagnated, and there is a strong division in professional boundaries. There is also specified the need to improve education consistency (across levels

[2] Deloitte provides services in audit, tax, consulting and financial advisory services to public and private companies in a variety of industries. Deloitte has a network of member firms in more than 150 countries and has approximately 182,000 professionals. (Deloitte, 2013)

of education) and improve education interests interactions (for example, between carpenters and masons).

The construction sector goes beyond the executing construction companies (57%) and also includes other parts of the construction value chain, as manufacturers building materials, tools and machinery for the construction (15%), trade with building materials (12%) as well as architects and consulting engineers in the construction business (13%). In relation to Fig. 2.2-3 these aspects are further specified:

Performing construction companies: For example, contractors, carpenters and joiners, electricians, plumbers and plumbing businesses, bricklayers, painters and other specialized trades.

Material Producers: For example, companies that manufacture metal constructions and parts, construction timber, joinery and building materials of concrete, as well as companies that manufacture asphalt and roofing, building articles of plastics, pipes and hollow profiles and fittings of steel, paints, varnishes and similar agents, doors and windows of metal.

Advisory companies: Includes architectural firms and advisors or engineering companies.

Besides these sectors, Danish construction sector include also trading building materials and tools and manufacturers of machinery and tools. Moreover, the Danish building sector is divided in two main parts depending on who the client is. First is the **public construction policy and regulation,** including guidelines for the public sector procurement of tasks, public support for private construction, public contributions to research, innovation and education, building regulations, rules for building applications, certifications, taxation rules, etc. Second is **the organization of industries and businesses,** including organized models compared to the value chain, collaborative structures on across industries and companies, standards for the construction and materials, organization of capital market, and the organization of research and training. (Deloitte, 2013)

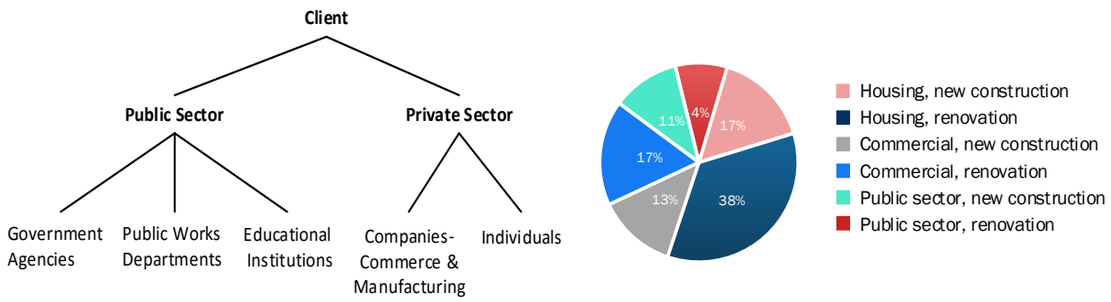

Fig. 2.2-4 Categories of customers in Building Industry (Windapo, 2013, p. 86; Deloitte, 2013)

As mentioned before, construction projects are supposed to serve certain purposes and are performed on demand. The demand might be stated by either the private owner or the public one. From Fig. 2.2-4 can be observed that the percentage of public sector is rather low (21%) compared to the private one (79%) and shows who acts as a private or public client.

Productivity and quality improvements in the Danish construction sector increase the income effects within the sector, providing more cost-effective services. This is vital to the national value creation by households' attitudes, companies and the public sector and there is a great difference between the needs of the private sector to public one. In some cases, private clients

can follow under the public sector category, which is explained further in this work, in Chapter 3.4 Tender procedure.

Danish building sector has many aspects as it can be observed in findings presented before. The further research in this report involves the building sector of Danish construction industry in regards to management of projects in both private and public cases.

2.3. Current vision of Danish construction market

The clear understanding of current contract organizations comes not only from being familiar with the history of the industry, but also from recognition of construction market definition. In general, the construction industry is divided into three sectors: housing building, non-residential construction and civil engineering. The total market value is presented as a sum of values of the constructions from each sector. (MarketLine, 2014) The data presented below are gathered by the MarketLine Industry Profile and presented in the publication from July 2014. More up to date, accurate data is not available for the authors due to limited resources.

Year	$ billion	DKK billion	€ billion	% Growth
2009	24.9	140.0	18.8	
2010	20.5	115.3	15.5	(17.7%)
2011	21.3	119.7	16.1	3.9%
2012	21.7	121.7	16.3	1.6%
2013	19.9	111.7	15.0	(8.2%)
CAGR: 2009–13				(5.5%)

Fig. 2.3-1: Denmark construction industry value: $billion, 2009-13 (MarketLine, 2014)

Category	2013	%
Non-Residential Construction	9.6	48.0%
Civil Engineering	5.9	29.6%
Homebuilding	4.4	22.4%
Total	19.9	100%

Fig. 2.3-2: Denmark construction industry category segmentations: $ billion, 2013 (MarketLine, 2014)

In 2013 total revenues from the Danish Construction industry was up to $19,9bn *representing the compound annual rate of change (CARC)[3] of -5,5% between 2009 and 2013.* (MarketLine, 2014). The five year plan from 2013 up until 2018 predicts the increase in compound annual growth rate (CAGR)[4] of 4,5 % bringing the value of the industry to $24,8bn. The Fig. 2.3-1 shows that the Danish construction industry shrank from 2009 by $5bn (8, 2%).

As stated before, Danish Building Industry includes three segments. However, those are not equal if it goes about the value. From Fig. 2.3-2 it can be seen that the largest segment is the

[3] CARC - The compounded annual rate of change shows what the growth rate would be over an entire year if the same simple percent change continued for four quarters or 12 months. (Elvis Picardo, 2015)

[4] CAGR is the mean annual growth rate of an investment over a specified period of time longer than one year. To calculate compound annual growth rate, divide the value of an investment at the end of the period in question by its value at the beginning of that period, raise the result to the power of one divided by the period length, and subtract one from the subsequent result. (Investopedia, 2015)

Non- residential construction (48%), followed by Civil engineering (29, 6%), the rest is covered by homebuilding (22, 4%). (MarketLine, 2014)

Year	$ billion	DKK billion	€ billion	% Growth
2013	19.9	111.7	15.0	(8.2%)
2014	20.8	116.8	15.7	4.5%
2015	21.6	121.6	16.3	4.1%
2016	22.6	127.1	17.0	4.5%
2017	23.7	133.3	17.9	4.9%
2018	24.8	139.3	18.7	4.4%
CAGR: 2013–18				4.5%

Fig. 2.3-3 Denmark construction industry value forecast: $ billion, 2013-18 (MarketLine, 2014)

The assumed future for the industry until 2018 is presented in Fig. 2.3-3 and as it can be observed, there is estimated to be an increase of the market. Furthermore, some of the leading and most relevant companies in the construction industry are briefly introduced in order to make the decision upon the proposed interviews.

2.3.1. The leading companies

The way that the industry operates is also defined by the companies themselves, which is why it is important to know the most influential ones. The literature available does not stand clearly which companies to the best on the market, which is why statistics published this year in the Internet were helpful in this step. The research for the accurate statistics was troublesome for authors of the paper and the two best choices are websites called Nordic Netproducts AB and Finans.dk that provide a number of information regarding constructing and contracting companies in Scandinavian countries. These data is analysed by the authors of the website and based on that, the site provides certain statistics. There have been chosen two sources for electing the companies in order to have more valid data.

RANG 2014	VIRKSOMHED	RANG 2013	OMSÆTNING (1.000 KR.)	NETTORESULTAT (1.000 KR.)	EGENKAPITAL (1.000 KR.)	ANSATTE
1	**PER AARSLEFF**	2	7.375.888	149.202	1.713.311	4019
2	**MT HØJGAARD**	1	7.358.200	33.300	1.116.000	3974
3	**NCC CONSTRUCTION DANMARK**	4	3.040.234	125.550	184.745	1111
4	**ARKIL HOLDING**	3	2.776.421	40.583	695.754	1741
5	**KEMP & LAURITZEN**	5	1.938.045	175	269.772	1797
6	**NCC ROADS**	6	1.862.863	47.244	270.288	951
7	**HUSCOMPAGNIET**	9	1.556.083	131.600	550.045	201
8	**A. ENGGAARD HOLDING**	8	1.523.291	74.785	573.226	406

Fig. 2.3.1-1: Top list of Brancheanalyse: Entreprenørbranchen, 2013 – Turnkey Contractors (FINANS, 2014)

	Company	Turnover (×1000) DKK
1	Højgaard Holding A/S	4 045 600
2	NCC Construction Danmark A/S	3 544 167
3	Enemærke & Petersen a/s	1 636 806
4	Hoffmann A/S	1 619 560
5	Enggaard A/S, A	1 521 074

Fig. 2.3.1-2: The largest companies by turnover in DK in the Construction industry (Nordic Netproducts, 2015)

Considering information from Fig. 2.3.1-2 and Fig. 2.3.1-1 and making an average between years 2013-2014, the leading construction/ contracting companies in Denmark are PER AARSLEFF, MT HØJGAARD, NCC and A. ENGGAARD. The reason why A. ENGGAARD is placed at eight position in Fig. 2.3.1-1 is because in the table there are taken into account the civil engineering companies, but A. ENGGAARD is mostly construction oriented. There have been selected other two companies for interview contact: HP BYG and TL BYG, because they differ in size form the leading companies and getting the information from employees from various size firms brings additional value to authors' findings. Additionally, the close location to Aalborg was also an advantage.

In the following lines there are presented the annual reports of fours of the firms, in order to provide reliability of why they were elected for the further interviews.

Per Aarsleeff

Per Aarsleff was established in 1961 and has since grown to become one of the largest contractors, which also carries out large projects outside the country. Per Aarsleff A / S performs general infrastructure projects through a number of subsidiaries and associated companies. The Group operates in the segments plants, tube techniques and foundations. (Lundby, 2015)

Per Aarsleeff Income statement

(Amounts in 1000 DKK)	2010	2011	2012	2013	2014	2015
Revenue	4,337.38	6,147.48	6,676.16	7,375.88	8,522.363	* 08/27/2015 (sqm / Upgrade) Per Aarsleff now expects a profit before tax of 450 million. kr. for 2014/15 (Lundby, 2015)
Operating profit	62,195	136,318	181,656	213,399	350,482	
Profit before tax	65,799	133.379	165,937	196,946	329,678	
Net profit	48,008	97,778	112,062	149,892	254,609	
Equity	1,397.64	1,471,851	1,593.748	1,724.330	1,952.308	
Total assets	3,513.48	4,366.87	4,241.89	4,536.61	4,970.947	
Number of employees	3,162	3,473	3,620	4,019	4,532	

*Data provided in the table are extracted from the annual report from Dansk Aktie Analyse (Lundby, 2015)

According to Dansk Aktie Analyse: "*The company now expects a profit before tax of 450 million. Against the previous 390 million. For the year as a whole, a higher growth than forecast at the beginning and that the positive trend in earnings of individual projects is maintained.*" 08/27/2015 (sqm / Upgrade) (Lundby, 2015)

MT Højgaard A/S

MT Højgaard A/S is a part of the parent firm Højgaard Holding A/S, dealing with construction and civil engineering works. The firm is located in Copenhagen, Denmark, however they also operate in another Scandinavian countries as well as Middle East and East Asia. The company

has a wide area of expertise. Construction projects cover residential buildings, commercial facilities, schools, multi-storey parking spaces, hotels etc. The civil engineering team works on roads, bridges, marine/harbour works etc. Moreover, the company provides services such as design, field works (mining/ offshore works), refurbishment or project development. (MarketLine, 2014)

MT Højgaard A/S Income statement

(Amounts in DKK million)	2010	2011	2012	2013	2014	2015
Revenue	8,303	9,307	9,735	7,464	6,979	**Revenue: Around DKK7 billion Operating profit: DKK 325-375 million
Operating profit EBIT	94	-332	-507	165	-201	
Profit (loss)before tax	100	-335	-597	209	-186	
Profit (loss) of the year	61	-261	-512	107	-252	
Equity	1,618	1,289	771	1,181	822	
Total assets	4,698	5,654	4,433	4,014	3,646	
Number of employees	5,217	4,738	4,688	4,058	3,846	

*Data provided in the table are extracted from the annual report of the company (Højgaard MT, 2014)

** According to the annual report, the estimations for 2015 are:

"As a result of deferred project start-up and temporary extension of Greenland Contactors' activities at Thule Air Base. Revenue *Outlook previously DKK 7.0-7.5 billion Operating profit before special items DKK 325-375 million Previous outlook DKK 300-375 million. The effect of revenue changes and temporary extension of Greenland Con-tractor's activities on the Thule Air Base. Operating margin before special items Approximately 5% Previously 4-5%. "* (Højgaard MT, 2014)

NCC Construction Danmark A/S

NCC AB is a big, international group, divided into three areas of expertise such as industrial works, construction and civil engineering segment and project development. The head quarter of the company is located in Stockholm, Sweden, however the company has shares also in Finland, Norway, Denmark, Germany, Russia (St. Petersburg), Estonia and Latvia. (NCC AB, 2014) Each segment of the company is responsible for different services. The industrial one conducts all kind of road services including offering input materials such as aggregates or asphalt. The construction and engineering segment deals with execution of residential or commercial properties and industrial facilities. *"The group's development business […] develops housing solely for permanent residence and offers two types of housing: group-built single- family dwellings and multi- family buildings."* (MarketLine, 2014)

NCC Construction A/S Income statement

(Amounts in SEK million)	2010	2011	2012	2013	2014	2015 Jan.- Sept.
Revenue	4,933	5,503	5,495	5,796	5,691	**3,727**
Operating profit EBIT	2,254	2,017	2,519	2,679	2,604	**1,389**
Profit (loss)before tax	2,008	1,808	2,277	2,400	2,234	**1,094**
Profit (loss) of the year	1,527	1,312	1,910	1,989	1,838	**879**
Equity	8,132	8,297	7,649	8,675	8,867	**7,923**
Total assets	31,104	32,924	38,958	38,793	38,987	**40,912**
Number of employees	17,745	17,459	18,175	18,360	17,669	-

*Data provided in the table are extracted from the annual report of the company (NCC AB, 2014)

A. Enggaard A/S

Construction oriented company that is considered one of the biggest contractors, developers and real estate investors in North Jutland. Their competences include execution, engineering and ground works. The firm is one of a few Danish contractors developed enough to participate in projects publicly financed. Moreover they work includes also project development. (Enggaard, 2014)

A. Enggaard A/S Income statement

(Amounts in 1000 DKK)	2010	2011	2012	2013	2014	2015
Revenue	870.643	887.427	1.293.999	1.812.124	1.521.074	*no data has been found
Operating profit EBIT	194.274	83.823	99.656	175.768	179.255	
Profit (loss)before tax	146.077	30.117	40.037	103.846	102.852	
Profit (loss) of the year	109.725	23.398	30.431	78.699	77.218	
Equity	547.146	446.437	476.869	555.567	632.785	
Total assets	1.077.587	1.005.147	1.176.888	1.529.736	1.403.565	
Number of employees	142	188	215	319	254	

*Data provided in the table are extracted from the annual report of the company (Enggaard, 2014)

After the most recognised Danish companies are briefly described and elected based on the relevance to the report, the plan was to receive answers from all the six elected companies, but only two of them answered: Casper Bach Munkholm from TL BYG and Lars Ørvad Nielsen from NCC. (APPENDIX A and B) The authors sent emails to all the companies several times, but no answers were received because of either the English language barrier or the lack of time.

Conclusion to the chapter

This chapter goal was to describe the background events, which are behind the Danish construction industry, so the present situation of the market can be better understood. Both private and public housing developments and project were included in the research, explaining why the percentage of the public project is lower than the private ones and highlighting the current vision of the Danish construction market and the leading companies in such industry.
In the next chapter are presented the project parties and phases including the most relevant contract agreements used in Denmark. The general legal basis for the tendering procedure is also included for both Denmark and UE.

3. CONTRACT ADMINISTRATION

In this chapter, the standard project participants for the construction industry are presented: building owner/client, contractor, architect/engineer, advisor and supplier. Based on the BO's wishes and choice, there are several contractual agreements and agreed documents that can be used between the project parties. In this process, the tender procedure is very important because it depends if the public funding is included or not and different rules apply for DK and UE. Additionally, some of the most important and relevant to the report legal basis for both DK and UE are stated as well.

3.1. Project parties

Typically, parties executing projects in the building industry must harmonise when working on particular phases of project, such as programming, designing (incl. tendering), constructing, operation and dismantling (see Fig. 3.1-1). The responsibility hierarchy level is different from project to project, granting the BO is always in the top. Traditionally contract wise, the architect produces the design for the BO, followed by the execution performed by the contractor with assistance from the suppliers, this ending with the achievement the goal of the project. During design and execution, each involved party brings their own professional expertise within their competences as an input to the project process, meaning that each particular party is responsible for their own work packages. As a congruence between collaboration and trust, such boundaries are not crossed for the sake of project success. (Wandahl, et al., 2011; Bertelsen, 2012)

Generally, during project process management serious problems arise because of many different factors, main of them being: *market environment, culture, language and approach*. This happens because any project, regardless of size or form of founding is always constrained by the Iron Triangle: cost, time and quality. This means that the management mechanism introduced in Fig. 3.1-1 has a big influence on creating changes within the project management and its accomplishment. Moreover, inter-organisational trust in projects is always linked to the cost fluctuations and the project performance. (Wandahl, et al., 2011; Manu, et al., 2015) Depending on the number of participants, previous correlations or contract setups, trust can be tough to be achieved, however there is many advantages of working within trusting environment. Further description on trust is presented in Chapter 7.3.4 Trust as an important part of the construction project.

Due to so many uncertainties and unexpected factors that have a low likelihood of happening, the project-based settings are able *to respond to new information and approach work in a flexible manner when relationships are driven by trust, thus contributing to significant time and cost savings.* (Manu, et al., 2015, p. 1496) Moreover, the parties are motivated to collaborate and exchange reliable information, acting positively to the overall goal of the project.

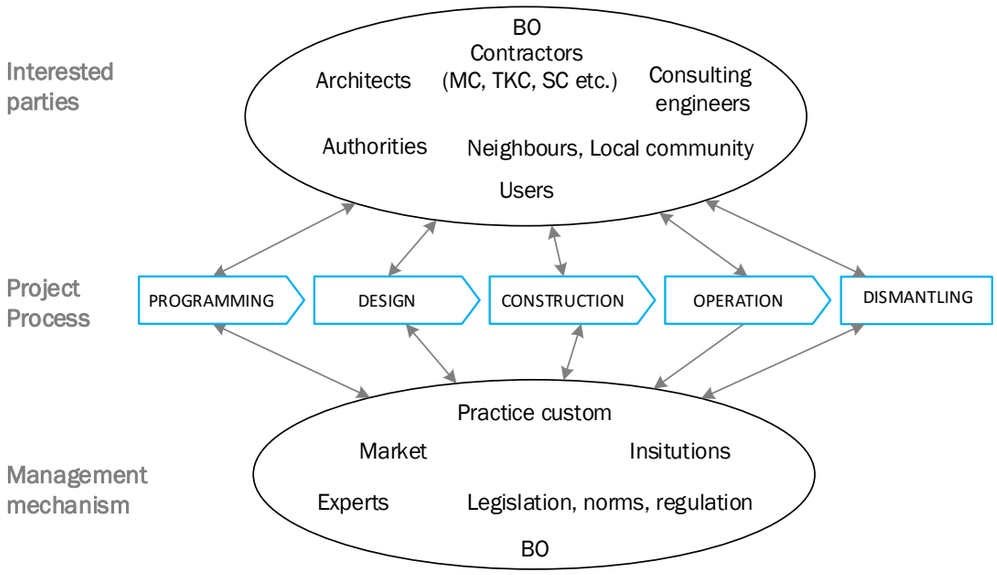

Fig. 3.1-1 Partners of the construction (Ussing, 2014)

Fig. 3.1-1 presents the common stakeholders, which generally include the building owner, contractors, advisors, architects, engineers, authorities (government if public funding), local communities, neighbors and users. These parties are essential because they participate at different degrees though all the phases of project process. Depending on the project environment there might be more participants included. (Chapter 3.3 Contract agreements)

Management mechanism presented in Fig. 3.1-1 defines the boundaries and legal possibilities for the project environment depending on the *market environment, culture, language, approach, etc.* The legal framework is presented in Chapter 3.4.1 Legal basis for UE and DK.

Further, the main actors' input into projects such as BO/Client, Contractor, Architect/Engineer, Advisor and Supplier are briefly described in order to indicate their responsibilities through the project phases.

Building Owner (BO) /Client

A BO is the person who pays for the work carried out and is in the possession of the building in the end. He/she should participate in the planning process in order to provide a contractor with the necessary information for the erection of the building. The activities of the owner during the whole project process depend on whether the construction is done for his/her private usage, or rent/selling purposes. Nonetheless, in terms of cooperation with contractor/ architect/ consultant/subcontractors etc. the BO acts as a client. The role of the client can be delegated to *professional construction managers* by signing the contract (so that it is legally valid). (Sutt, 2011) The relationship between the architect, contractor and BO should be constructive and trustful for a successful project implementation. (Appendix B. Interview with Lars Ørvad Nielsen by mail)

"Owners must be as fair in their dealings with their design and construction team, as they expect those members to be fair to them. The three tenets of a well-executed construction project can be summed up in three words: fair, responsible, and reasonable. An engaged and knowledgeable owner is a prime requisite for a successful construction project." (Levy, 2010, p. 9)

BO is entitled to appoint the advisor for himself who is supposed to ensure the smooth collaboration with contractor(S), architect(s) and engineer(s). Depending on the type of construction, the BO is entitled to choose the type contracting agreement that is suitable, usually taking the guidance of the advisor. (The Danish Council of Practising Architects (PAR), 2003)

Contractor

Contactor is the person or the firm, which agrees to supply materials or perform construction services for a specified price. Contractors can be elected in different ways. Depending on the project size and founding included, the contractor is selected either directly by the client and delivered the project documents, or selection is done by competition of contractor's offers (Sutt, 2011) (Chapter 3.4 Tender procedure). Responsibilities of contractors differ due to the contract types agreed upon. The contract types are described in the next subchapter.

In case of the private projects, when BO has a possibility of selection of the contractor, he/she should take into account the reputation of the contractor or his/her work in previous similar projects when electing him/her. "*Integrity and excellent past client relationships are the hallmarks of a successful, competitive contractor*." (Levy, 2010) (Appendix B. Interview with Lars Ørvad Nielsen by mail)

Architect/Engineer

The role of the architect or engineer is the most significant on the very early stages of the project, namely planning and design. The involvement of those parties in further parts stages of the enterprise depends on the contract organisation of the project.

Sometimes the architect or the engineer is assigned to be the Project Manager for the construction phase, depending on the contract agreement. At this point, the duties are developed and include leading, organizing, controlling, and supervising. The PM must then evaluate, measure and control the processes, monitoring the budget and time. (Yadollahi, et al., 2014)

Regardless to the contract organisation, the architect is responsible for design of the project when the engineer is accountable for the design of the construction, statistical estimations and load calculations. Their roles can switch depending on their knowledge and experience within the field. It is very important for those parties to have an effective collaboration with the contractor who is to execute their ideas. (Yadollahi, et al., 2014) (Appendix B. Interview with Lars Ørvad Nielsen by mail)

Advisor

The advisor's job is to instruct either the BO or contractor (relates to turnkey agreements specified 3.3 Contract agreements), on project technical matters depending on the chosen contract form. "*At the initial stage of the consultancy process, the client's advisor assists the client for determining the optimum form of cooperation for the client, including providing a description of the advantages and drawbacks of the individual consultancy and contract forms in relation to the project in question".* (The Danish Council of Practising Architects (PAR), 2003) In case of discrepancies often seen between contract parties, then advisor tries to find a solution for the problem.

Some owners choose either an architect or an engineer in the beginning stage of the project and others prefer a firm specialized in the kind of project that is considered. By doing so, the owner expects a good performance for the main parties involved in the project. Other owners prefer to have also an advisor when dealing with traditional form of contract in order to make sure that neither the architect/ engineer nor contractors are not making cheating decisions profit wise. (Sutt, 2011; Bertelsen, 2012)

Supplier

The suppliers play an important role in the construction process of a construction process because the contractor cannot execute the design without the help from the subcontractors and suppliers. The supply chain management and the material supply are significant processes that must be coordinated carefully by the Project Manager in order to fit within the time and cost frame of the project environment. (I.A. Motawa, 2007)

For private project, is ideal for the building owner to have a good collaboration with the other contractual parties even from the initial stage, meaning to include suppliers and subcontractors into design phase in case it is possible. For success in the projects accomplishment, it is beneficial that all the elected partners contribute with ideas in such inception stages. However, when public funding is included, suppliers or sub-contractors cannot participate in the designing process for two main reasons: it would be a conflict of interests because personal desires should not be a priority when choosing suppliers – everyone must have a chance of submitting a bid and secondly, it is against the Tender act and EU Directives – transparency and equality principle (Herforth, 2014; Forbrugerstyrelsen, 2015)

The parties specified above are the main ones when referring to construction contracts. In Chapter 3.3 Contract agreements, there are presented the construction contract types, which are the most common in Denmark.

3.2. Project phases

The construction industry is different from any other industries because every build project is unique and is impossible to create a universal policy for 100% accurate performance. This is the reason why there should always be a capable expertise in charge of each project, someone who knows how to deal with innovation and management. Moreover, the construction process takes a long time and contains a large number of partakers, which need to be coordinated within a specific time and cost frame. Besides, there are several aspects that need to be considered such as: *"modern technologies, increase of quality, reduction of factory costs, reduction of power demands, environmental protection, planning for real, and keeping of the agreed deadlines."* (M. Nový, 2012, p. 189) These features have impact on the project development because it might implicate short notice changes within limited costs and resources. In this way is then highlighted the importance of a proper manager/leader and the suitable teamwork of the participants.

As a general guideline in the building industry that includes the planning and management procedure, the most appropriate aspect is to use project management methods in order to keep the project on the noble path and to ensure the achievement of the project goals, in one word success. (M. Nový, 2012)

The general objectives of the projects implementation and projects management are usually divided in three levels cost (price), time (deadlines) and implementation (standards, quality). Yet, in order to achieve desired goal the work should be distributed into phases and work packages in order to have a better control over the activities from initiation of the idea through planning, understandings and handing over procedure. On account of value-added quality of works and effectiveness on construction projects, the idea is to distribute the entire cycle into phases, representing the specific work packages. Depending on contract organization of the project, there are different parties appointed for being responsible for particular activities in each phase, which is described in further part of the report, Chapter 4 PROJECT TYPES. In Fig. 3.2-1 there is presented a typical organisation of the main stages of projects division that are: project preparation, schematic design, project, preparation of realisation, realisation itself and end of realisation phase. (M. Nový, 2012)

Project preparation phase is the first step when analysis and surveys are made, in order to procure the land if not procured yet and to define what should be achieved and how it can be done. Usually, there is an advisor in charge of guiding the client through this process. A draft schedule is prepared to some extent, in order to see the overall picture of the project. The client decides whether the proposed objectives are feasible under the given conditions and whether the project should happen or not.

Schematic design embraces the preparation of the documentation for the planning procedure, including decisions on construction location and rough development. Moreover, the contracts with the chosen consultant/advisor/architect/engineer are agreed upon.

Project includes the preparation of the building permit proceedings containing the necessary drawings and documents for such accomplishment.

Preparation of realisation is the most difficult and costly part, which should result in a practical construction. This phase involves a construction schedule as the basis for its actual realisation. Moreover, in case necessary, the tendering procedure is performed and this is completed by the chosen contractor.

Realization represents the real progress of activities regarding the construction in accordance with all conditions, even those that are unexpected. In this phase there are included site reporting formats, documentation for territorial, building and occupancy procedure.

End of realisation is the time when the last touches and the handing over protocol happen. It is also a blissful time for the contractor to receive the final payment, but not before the planned and achieved results are evaluated. Depending on the client wishes and the contract agreement, this phase can further lead to the operation and maintenance procedures. (M. Nový, 2012)

The definitive stages for design and construction process are presented above, but there are many other pivotal factors for the success of a project. The main idea was to state roughly, how the division of the basic phases is made in order to have an overall idea in what manner a general project is developed from start to end. Nevertheless, any project should be well defined and planned in all the critical aspects and for this to happen there is a necessity for a person in charge, who is able to cope with all these proceedings - the Project Manager.

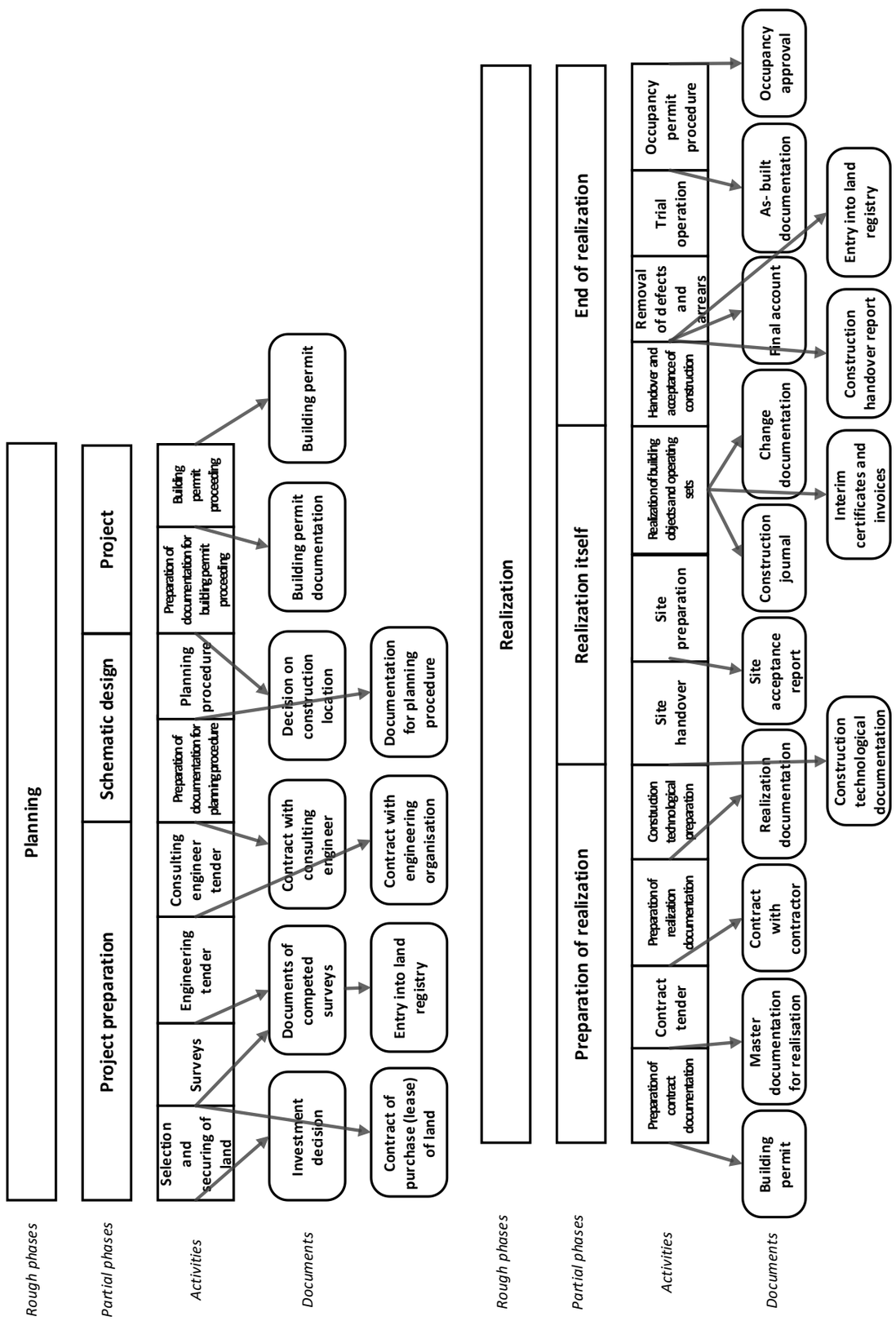

Fig. 3.2-1 Project phases (M. Nový, 2012)

Projects executed within the Building Industry are very complex. Each construction demands detailed planning on particular phases and careful consideration of circumstances and client's wishes. Each phase of the project is unique and there are different parties involved within the process. Therefore, Building Industry management is a comprehensive concept, which requires high precision and worthy skills in all the activities: *planning, organizing, human resource management, operating management, controlling, decision making, informing, documenting*. It is impossible to fulfil the objectives of a construction project without having a good project/change management approach and this can be done only by having a good collaboration with all the stakeholders involved. (M. Nový, 2012)

3.3. Contract agreements

A construction contract is usually different from any type of contract because it is more complex than the rest. Construction contracts include terms such as the time schedule of the project, agreed price and tasks to be performed, thus, due to unpredictable circumstances or mistakes, the amount of work and duration can change during the project realisation. A construction project is basically a continuum of contracts: contracts between a building owner and the architect, between a BO and a contractor, and between the Main Contractor and the subcontractors.

According to the book *Construction Contract Law,* a traditional form of contract is defined as *"an entire contract for sale of goods and work and labour for a lump sum price payable by installments as the goods are delivered and the work done."* (Adriaanse, 2005)

In Denmark there is no clear legislation concerning construction contracts, this being the reason why most of the contracts are based on agreed documents decided by the Danish construction industry. There are three main general provisions that are used: GC89, GC92 and GC93. These agreements are suitable for either small buildings or large construction contracts. (Bejder, 2007, p. 113; Herforth, 2014)

GC89 (General provision for technical advice and assistance), this legal document is being used between the contractor and the consulting companies acting as advisors for the project. It is usually used as a basis for agreements for consultancy services, including architectural and engineering assistance. It describes also the principle of how a project is developing from the beginning until handing over including the roles of the parties involved in this process. GC89 includes information about requirements for the technical counselling agreement, remuneration, copyright, deadlines, liability in case of breach or delay, postponement and suspension of duties and litigation. (Bejder, 2007, p. 115; ABR 89, 1989)

GC92 (General conditions for work and services in the construction business), the parties involved in this document are the contractor and the subcontractors or client and contractor and they agree upon the extent of the works and responsibility each one has. The contractor being the one responsible to deliver part of the overall performance. In general, GC92 contains information about the basis of the agreement, the offer and acceptance, the transfer of rights and obligations, security provision and insurance, performance of the contract, remedies in case of breach and non-conformity, the parties' collateral prior to the contract, organisation of the work schedule for the contract, progress of the work, settlement of the price, one and five year inspections, special information on cancellation and litigation. (Bejder, 2007, p. 117; GC92, 1992)

GC93 (General conditions of turkey contractor 1993) being used as an agreement between the client and the Turnkey Contractor, the second one being responsible for both design and execution of the project. It also includes contractual basis for all or part for the design performance. GC93 mainly follows the guides from GC92, only that it includes also rules that the Turnkey Contractor is not only responsible for the building performance, but also for the project management. (Bejder, 2007, p. 117) Some of the benefits for the building owner included in GC93 are that there must be an early fixation of time and price because the Turnkey Contractor is responsible and bears the risk of time and price. Additionally, there is the

simplified liability, because regardless of whether a defect is due to a design or execution error the BO can claim the contractor. (GC93, 1993)

As similarities between GC92 and GC93 can be enumerated the most important ones, such as: the contract form guides, insurance, terms of payment and performance bonds amount and duration, which both the client and the contractor must provide (if agreed upon). Although, there are several particularities in GC93 and the most noticeable of them are regarding the tender duration which is increased to 40 days and not only 20 days as it is in GC92, regarding time extension periods, unforeseen conditions and public requirements. (GC93, 1993)

All three documents mentioned above include the interest of both the contractor or the client or the contractor and the technical advisor and they are helpful in case there is the need to mediate problems during design or construction phase. Moreover, the parties are allowed to add or remove provisions in order for the agreement to fit better the needs for each part included in the contract. (GC93, 1993; Herforth, 2014)

3.3.1. Partnering- contract set up

Public- private cooperation (PPC) is a concept of the collaboration between public authorities such as government and private entities. Such collaboration can be established in numerous ways, depending on the enterprise. The need for the project comes from the public authorities delegate the execution of the task in form of the contract to private market. The ideology behind PPC stands for improvement of project performance cost quality and time wise when working on buildings that are to be used by the society. (Herforth, 2014; Forbrugerstyrelsen, 2014)

Public-private partnerships (PPP) is one of the ways to design PPC. It is characterized by the establishment, operation and maintenance, which are planned in the supply of a public investment, usually regarding construction projects. Such contract can be used for both public and private financing and the duration of such agreement lasts for 15 to 25 years. PPP provides total financial benefits because the provider has the option to choose the most optimal solutions for the construction and maintenance of the building. (Forbrugerstyrelsen, 2014)

The first attempt of introducing PPP in Denmark was done in 1999, however Danish Building Industry was very resistant to it from the beginning. Due to political situation at the time in the country that did not accept private funding in public use project, the introduction of the concept went unnoticed. The situation started slowly changing in 2001, leading to the plan of popularising PPP announced in 2004. Even though the plan was rather ambitious, the initiative did not kick off, due to the fact that "*the Danish regulatory authorities seem to have adopted a less favourable interpretation for PPP than elsewhere*." (Helby Petersen, 2010, p. 176) Because of that there was a number of issues when applying PPP in contract arrangement with for example ownership during the process, tax and VAT and general

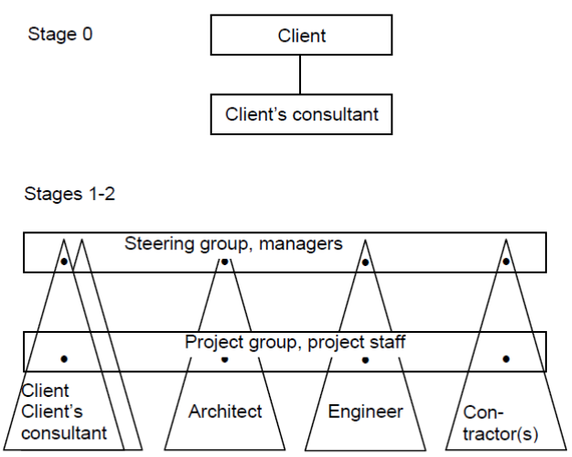

Fig. 3.3.1-1: Project organization under PPP (The Danish Council of Practising Architects (PAR), 2003)

rules regarding the arrangement. (Helby Petersen, 2010) However, even though the authorities were sceptic to the concept from the beginning, it gained on popularity over last few days and more and more projects are being executed using PPP. (Forbrugerstyrelsen, 2014)

PPP can be good choice for big and complex enterprises because, as observed in Fig. 3.3.1-1, all the parties involved in the project share the risk responsibility for the construction, this ensuring that they perform best and cheapest. Risk sharing is an important factor for the projects to be delivered on time and budget, because in case of such problems they are usually transferred from the public contracting authority to the private PPP supplier.

Another important aspect is that in contrary to arrangements based on GC92 or GC93, the defect liability is not time limited to 5 years, taking into account that it is a financing process that runs between 15 to 25 years. This also represents the fact that the need for coordination and management increases, which means that significant consideration must be taken in the initial stage of the project, regarding who to be included in the project's steering committee and project management. (Boligstyrelsens, 2004)

There are two types of partnering. First one is early partnering, where both consultants and contractors are chosen early in the process, this being suitable for all types of contractor set: turnkey, main and trade-by-trade. The second is the late partnering, where the design consultants are selected first in compliance with the tender rules valid for the execution. This type is less suitable for the Turnkey Contractor set up because this contract form involves a change of design consultants from the brief stage. (The Danish Council of Practising Architects (PAR), 2003)

As stated above, partnering is a special form of cooperation, which has as main target to create a culture of collaboration across traditional disciplinary boundaries, hierarchies and stakeholders. The main idea is to master the cooperation and gain the confidence between the involved parties with a mutual objective based on common economic interest.

This type of contractual agreement can bring many benefits for the building owner by having a more confident management of economy and quality, dealing with fewer misunderstandings when transferring the project to the contractors because they have been a part of the project since the beginning. In addition, use of PPP in the construction phase can help reduce waste time, errors and omissions in the execution and delivery. One aspect which might not be so beneficial is that the resources needed are numerous, being more than in an usual construction project. Another one is the fact that partnering is a new concept which has not been used for long in Denmark, which can bring some collaborations issues between the parties at least in the beginning when not every party is accustomed to the concept. (Boligstyrelsens, 2004)

In this paper, the focus is on the Turnkey Contracts and on the work of the Project Manager and in this case, are chosen the general provision according to the GC93. Although such a documents is mostly used when parties agree upon contract terms and responsibilities, without explaining into detail what kind of works the Project Manager (Turnkey Contractor) must perform in order to have a successful building performance from the beginning..

3.3.2. International contracts

Previously mentioned contract set ups apply in various circumstances between Danish contractors and clients. However, it is rather complicated to apply Danish roles and standards when international firms are included in collaboration. For this reason, few legal documents are accepted in Denmark to be used as a base for contract formulation within international projects.

An example of such legislation can be FIDIC, which is a contract language created by an international organization for consulting engineers from 97 countries. They produced a standard form agreement that can be used internationally by the parties involved in a construction project. The structure of the agreement is based on French approach of structuring contracts combined with engineering way of thinking. The main target of FIDIC association is to promote the common interest of its members supporting assistance and service to consulting engineers that are working internationally. (Bejder, 2007, p. 120; Herforth, 2014)

FIDIC is a standard contract wording that must specifically be implemented to form part of the contract. In case of deviations or changes, they must be stated clearly and then placed in an appendix with reference to the particular clause in the standard wording. Sometimes this may be damaging a contract relationship due to its complexity and unpleasant way of usage. Moreover, it includes also a large amount of policies and rules concerning the building performance and design and sometimes it can be very challenging when used, making the FIDIC contracts very troublesome on everyday operations. (Bejder, 2007, p. 120; Herforth, 2014)

Another example of international contract set up is the Nordic Agreement. Those have been issued by engineering associations in Denmark, Norway, Sweden and Finland. The agreement form 1992 relates to supply of machinery and other mechanical, electrical or electronic equipment, the one form 1994 includes rules for erection of those mentioned before. However, due to the fact that this contract set up relates only to a specific part of construction it is not discussed further in this work. (Forbrugerstyrelsen, 2015; Herforth, 2014)

3.4. Tender procedure

Tendering process is a required way of contractor selection for public projects. The process is regulated by law on each of its phase. Tender procedures are also regulated by the contract organization between parties, however the very first selection of contractors is always prepared by the client and his advisor, based on client's requirements for the project. Regardless to client's wishes, organization of the project etc. each tender procedure has to be done due to equality and transparency principal of law. Equality principal means that comparable situations must not be treated differently – unless such treatment is objectively justified, when transparency one stands for obligation of openness of evaluation in order to ensure that the equality principle was respected. (Herforth, 2014)

Until 2001, in Denmark the only available award criterion was *the lowest bid*, meaning that the contractor who had the lowest price for the project wins the right for execution. However, this turned out to be troublesome, because the prices were often calculated wrong, forgetting to include significant costs of construction, leading to the increase of expenses and higher project

cost in the end. Therefore, ever since 01.09.2001 there is different criterion, called *most advantageous bid*. This one allows the client to specify different principles, due to which the bid is evaluated (*time, quality, operating cost* (Sutt, 2011)). However, setting the right criteria for this kind of bidding is rather complicated due to equality and transparency principles, and, unfortunately, it often happens that the participants of the bidding feel mistreated. (Ebbesen & Ussing, 2010; Herforth, 2014)

3.4.1. Legal basis for UE and DK

Construction projects can be categorized in a few different ways. First of all, due to the size and complexity of the project it is possible to distinguish big and small ones. The article *Project types in building and construction* by Torsten Grennberg shows another classification of construction projects. He describes eight particular types, which vary in focus points, depending on client's demand. Client's goals are associated either with the quality of the final product, or cost or time. Obviously each of those points are important for the client, however the demand usually focuses on either one or two of them, meaning that the third one can be slightly compromised. Third and the most important to this report classification of project is by their financing method. (Grennberg, 1993; Jonas B. Ebbesen, 2013)

Generally, private projects (if not subsidized project) are characterized by owner's freedom of choice, meaning that because he/she funds the whole project, he/she chooses the team etc. no matter for the size of project. The situation when any public founding is necessary for project execution the selection of the contractor happens by competitive bidding (tender procedure). The tender rules of construction projects depend on the price range of the project and on the type on entities involved. (Forbrugerstyrelsen, 2015; Herforth, 2014)

2005: The Public Procurement Directive of public works, public supply and public services is implemented in Danish law[5]

- *Acc. art. 1, stk. 9 it apples to: Public authorities, Public bodies*
- *Supports the goals of a single European Market*
- *Construction work; execution or design & execution*
- *Purchase of goods and services*
- *Financial threshold [6] for when it applies – differs depending on construction, goods or services to be procured and possibly type of procuring entity (state, region, local)* (Herforth, 2014)

2005: The Public procurement Directive on water, energy, transport and postal services is implemented in Danish law[7]

- *Acc. art. 2. it applies to: Public authorities, Public bodies and Private entities*
- *Supports the goals of a single European Market*
- *Purchase of supply services in special fields: Water, Energy, Transport, Postal* (Herforth, 2014)
- *Financial threshold for when it applies – differs depending on construction, goods or services to be procured and possibly type of procuring entity (state, region, local)* (Herforth, 2014)

[5] https://www.retsinformation.dk/Forms/R0710.aspx?id=137281
[6] http://www.udbudsportalen.dk/Ret-og-regler/Tarskelvardier-for-20122013/ (Tærskelværdierne i EU-udbudsdirektiverne ændret med virkning fra 1. januar 2014. De gælder i 2014 0g 2015.)
[7] https://www.retsinformation.dk/Forms/R0710.aspx?id=26714

2007: Danish Tender Act[8]

- *it applies to: Public authorities, Public bodies, Private entities (if subsidized project) or when the contractor or the BO who is a public authority or public body is contract partner for construction not goods*
- *Enhance competition, ensure equality and transparency, ensure economic reasoning*
- *Construction work; execution or design & execution*
- *Purchase of goods above 500.000 DKK*
- *Below the financial threshold of the EU Procurement Directives* (Herforth, 2014)

* Danish Tender Act among others leads to greater clarity, flexibility and simplification of procurement rules. Both the public authorities and the private sector can look forward to significantly lower costs associated with supply when the new act comes into force. Danish Parliament (19 November 2015) adopted a new tender act that comes into force on 1 January 2016 and sets the framework for more effective public procurement for the benefit of both public authorities and the private sector. (Forbrugerstyrelsen, 2015)

Thresholds 2014 and 2015

By Commission Regulation no. 1336/2013 / EU of 13 December 2013, the thresholds of the EU procurement directives amended with effect from 1 January 2014. The Commission on 12/14/2013 in Communication 2013 / C 366/01 published the following thresholds:

- *The thresholds are exclusive of VAT.*
- *Directive no. 2004/18 states that for construction work (Bygge- og anlægsarbejder:) the threshold is 38.624.809 kr. and for part works (Delarbejder): 7,447,900 kr.* (Forbrugerstyrelsen, 2015)

The most commonly known, therefore important aspects are that: for projects and provision of goods until 500.000 DKK the rules of *The Public Procurement Directive on public works, public supply and public service is implemented in Danish law (2005)* apply, otherwise the competition rules are stated in *New Danish Tender Act (2007).* (Sparlund, 2007) Additionally, if the construction work is more than 38.624.809 kr. then the EU 2007: EU Directive on ensuring effectiveness of the Procurement Directive[9] is applied. The legal basis of the bidding rules are not a subject of the research, therefore those are not included in the report.

3.4.2. Tendering issues in Denmark:

- Parties do not know procedures well leading to miscommunication and conflicts often ending up going to arbitration
- Lowest bid criterion- most often used (up until 2001 it was the only one available), however it is not objective because it happens that the lowest bidder usually does not calculate cost right which again leads usually to arbitration or to failure of the whole project
- Bidding on the most advantageous bid- tends not to be clear and confusing for participants, leading to misunderstanding. It often happens that loosing participants of the bid feel mistreated and under evaluated.

[8] https://www.retsinformation.dk/Forms/R0710.aspx?id=113858
[9] https://www.retsinformation.dk/Forms/r0710.aspx?id=131726

- Actors in building industry are quite resistant to change meaning that they do not want to experiment with building procedure as long as nobody does it before which is why there is no progress in the field even though there is a clear necessity of improvement. (Ebbesen & Ussing, 2010)

The author of the article *Tendering for personal competencies- a way of improvement? (2010)* performed a number of interviews in order to define an ideal tender procedure. Participants were united in stating that they all would prefer working with familiar companies in order to work with the same people. It can be deducted that the key- persons are even more crucial than the means of work in order to succeed with a project. Moreover, they commonly claim, that when having an impact on selecting the Project Manager, they would prefer someone who has focus on personalities, meaning the person who knows his team, prevents or solves conflicts and guarantees better communication. (Ebbesen & Ussing, 2010)

Unfortunately, neither current Danish Tender Law nor EU Directive allows selecting teams, meaning that there is no possibility for creation of the team from the beginning. Moreover, personal criteria cannot be taken into consideration for most advantageous biddings, because those cannot be judged objectively, leading to loosing transparency of the whole procedure.

Conclusion of the chapter

This chapter purpose was to present the general programme for a construction project in the Danish industry. First, the main stakeholders were enumerated and briefly described including then the project development phases for a building project in general. The most relevant for Denmark contract agreements and agreed documents were also highlighted in order to see which one fits best the client's wishes depending on the type of building and contract he/she chooses to be build. This aspect implies also the tender procedure, which can be indeed different if the BO is a private entity or a public one.

4. PROJECT TYPES

There is a good reason behind each construction project being organised within phases where responsibilities are divided according to needs of the project and expertise of included parties. Generally, by following the common flow of the project phases, any design changes should occur before or during the design stage making it easier to manage the time frame and expenses of the project. Nonetheless, it can happen that design changes have to be applied to the project material after the design phase is terminated, either due to the mistake of either party or client's/ BO's wishes. Such event does not work in project's management favour, because it demands extra time and extra costs.

The Fig. 4-1 shows the correlation between the costs of changes in project material over the duration of it. As visible, at the initial stage of the project, applied changes do not have much of an influence on the cost of the enterprise, however, the more project progresses, the more costly it gets to apply any unexpected variations. It happens because such event requires expertise of parties that were supposed to finish their work in previous stages, bringing more billable hours to the price of the whole project. Whenever design changes happen during the construction process, the case gets even more complicated because it requires reorganising the whole management approach time- wise, often brining more people on site or requiring additional tools/ machinery, which again leads to big additional costs. Therefore, the collaboration between parties has a great influence on the project organisation from the very beginning. The establishment of ideal work flow, based on certain agreements, not only leads towards reducing costs, conflicts and communication issues, but also good working process creates a long-term relationship, giving a possibility for future collaboration.

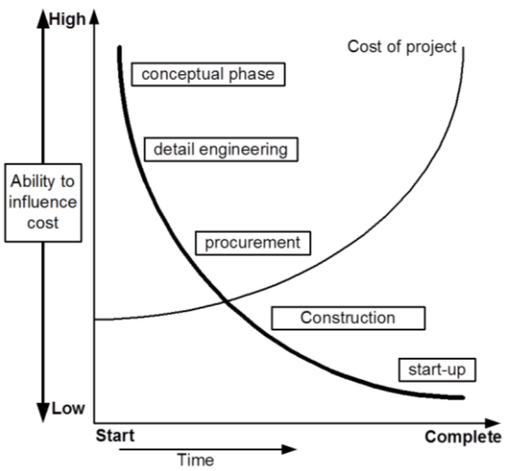

Fig. 4-1: Cost influencing the project outcome (Ussing, 2014, p. 5)

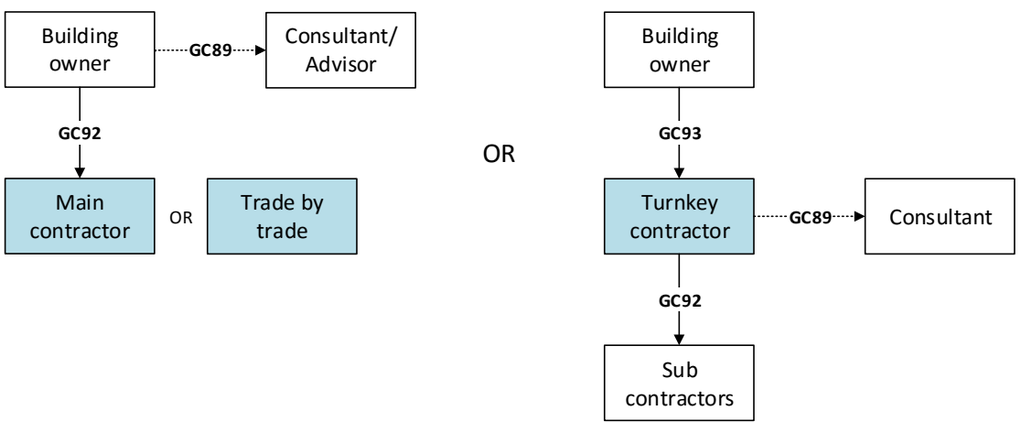

Fig. 4-2: Contractual agreements between different parties in a contract (ABR 89, 1989; GC92, 1992; GC93, 1993)

Usually, as observed in Fig. 4-2 in a construction contract, the main parties are the Building Owner (BO)/Client, Advisor, Architect and/or Engineer, Contractor. In order to have a successful execution of the project they must collaborate well and work together to gain previously agreed

common goal. Due to variability and complexity of the project and BO's wishes, several kinds of contractual agreements between the parties are taken into consideration in this paper (Trade-by-trade, Main or Turkey) and presented in the following lines.

Trade-by-trade refers to the BO being in charge of the project or service and electing the contractors to perform the work. In this case, BO has all the responsibilities for choosing the most suitable persons for performing the work. In this particular case, BO acts as a Project Manager and he has all the responsibilities for each phase of the project. This arrangement of the contract is most likely to happen when the BO has the construction or management background, meaning that he is able to perform Project Manager's work. (Sutt, 2011)

Main contract (MC) is the firm chosen by BO or selected in tender process, in order to realise the execution part of the project only. This agreement is characterised by signing fixed, lump sum contract, when the general responsibility for the price, deadlines and quality of work is on contractor's side. (Sutt, 2011) In this type of agreement, for private bodies, the MC is entitled to choose the necessary subcontractors. On the other hand, when referring to public entities, the EU Directives apply and then subcontractors are chosen based on another tender competition, created by the building owner. Moreover, MC tends to be a big firm that is able to execute at least one part of construction as a self- trade, however the MC is responsible not only for the self- trade but also for another parts of contracts and collaboration with subcontractors. The design part of the project is the BO responsibility and usually he/she hires an architect for this job. (Herforth, 2014; GC92, 1992)

In a traditional contract form, the MC is responsible to carry out and complete the works agreed upon, following the design papers performed by the BO's architect. In this kind of arrangement, the MC does not have the decisive power; all the decisions are being made by the BO, who usually has his advisor.

Turnkey contract (TKC) is the type of agreement where the contractor is in charge of almost everything, including design and execution, meaning that the contractor provides a client with the key when the construction is finished. In this agreement, the BO is called the Client because he/she is procuring the building development. (Bejder, 2007) TKC is the one in charge for choosing the proper parties involved in the project such as architect, engineer, sub-contractors, suppliers etc. (GC93, 1993)

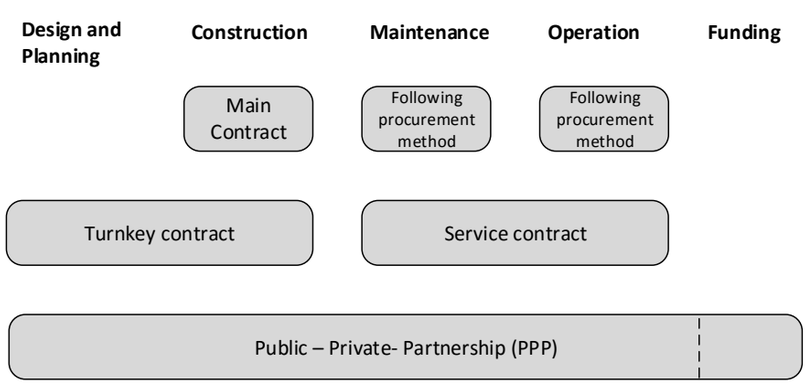

Fig. 4-3: Comparison between duration of different types of contracts (Forbrugerstyrelsen, 2014; Herforth, 2014)

As stated in chapter 3.3.1 Partnering- contract set up, **PPP** is a special form of cooperation, which has as main target to create a culture of collaboration between public authorities such as government and private entities across traditional boundaries, hierarchies and

stakeholders. The main idea is to master the cooperation and gain the confidence between the involved parties with a mutual objective based on common economic interest. In Fig. 4-3 it is shown the difference between the three mentioned above contract types and public private partnership, that includes all the process phases, starting with design and planning and ending with funding. (Forbrugerstyrelsen, 2014)

In the construction industry, there are also other kinds of contracting arrangements, more specific for particular project types. However, discussing them is not relevant for the purpose of this report, which is focused on the turkey projects. The authors refer in this paper to main contract (MC) also using the words traditional type of contract.

4.1. Traditional- Main contract

In a traditional contract form, the BO employs an architectural or engineering firm to produce a complete set of plans, specifications, and specific project requirements. He enters two, separated and independent contract with design company and the contractor. (Sutt, 2011) During the design stage, it is more probable for the BO to have an architect prepare the bid documents, receive the bids, and advise the owner on contractor selection. This is usually the first step of the process of gathering the necessary information in preparing the first draft. Moreover, the architect does the analysis of the proposals submitted by the bidders and the project finance assistance including details and instructions that must be provided for the potential contractor bidders. (Levy, 2010; Herforth, 2014)

According to the Appendix B. Interview with Lars Ørvad Nielsen by mail the developer (BO): *"prepares tender documents for the construction project, obtains any governmental permits and catches up deals on everything craft work from a single company and the main contractor is responsible for the coordination and execution of work"*

The architect or the engineer acts then as the Project Manager for the construction of the specific design and must collaborate positively with the parties involved in the project because he/she acts as an *"intermediary"* for owner and contractor in the administration of the construction contract. (Yadollahi, et al., 2014) *"Architecture and engineering are established business and managed by developer. They provide the finished drawing and description material and the supervision of the work and any construction meetings (paid by the developer)"* (Appendix B. Interview with Lars Ørvad Nielsen by mail)

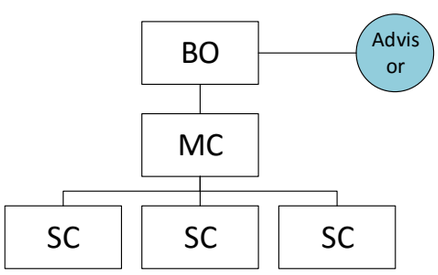

Fig. 4.1-1 BO- MC organisation

Besides design services including architectural, civil, structural, mechanical and electrical (only basis), the architect/engineer is responsible for contract administration services, including *periodic onsite visits during construction, full-time onsite project representation, contractor payment requests, testing and inspection services, quotation requests, and change order reviews*. (Levy, 2010) The BO has also the option to hire an advisor for providing him/her with guidance in choosing the most optimal contractors by presenting the building owner the benefits and disadvantages for the wished contractual agreement (see Fig. 4.1-1). (Herforth, 2014)

As mentioned above, before starting the construction process, the architect, engineer or advisor is in charge for the tendering process, preparing the bid documents, evaluating the bids and helping in choosing the most advantageous contractor for the building owner. In many cases, the bids received by a building owner during the tendering process exceed the required budget. This can occur from different reasons. The delay between the completion of the plans and specifications and the date when bids are solicited *may be subjected to inflationary forces in the marketplace*. (Levy, 2010)

The Consumer Price Index (CPI), and a time lag of 12 months, for example, can lead to increased labour and material costs when referring to inflation forces. Nonetheless, when the tendering process results in bids that exceed the BO's budget, either the architect or the engineer together with the BO should decide to work with the lowest qualified bidder, review costs, and make changes that are adequate for all parties to reduce the price of the work to fit the owner's budget. This may require some design changes, and an owner and his or her design consultants must consider all of those costs and determine that neither the construction program nor the quality is influenced by the changes. The negotiated scope of work and price can then be combined into the negotiated construction contract. (Levy, 2010)

After the contract agreement is chosen then the main contractor is selected either by negotiations or by tender process as discussed above. The building design must be completed at least to extend of *basic design* before the selection of the contractor takes place. The MC includes the fixed lump sum price agreement, which means that difference between the price of the project (the number given by the contractor as a total expense in bidding papers/ negotiations) and the cost of the project is the contractor's profit. (Levy, 2010; Herforth, 2014)

In case of the private investment, it is the MC, who is responsible for the selection of subcontractors and it is his/hers decision whether to do it by negotiations or tender process. In case of public project, the BO prepares the bidding material for subcontractor tender. After the selection is done, it is MC's job to take care about the collaboration between subcontractors. (Levy, 2010; Bejder, 2007)

Advantages and disadvantages of main contracts

One of the most important advantage of the main contract is that the BO signs only one contract for the execution of the project with one contractor. The latter is then responsible to find the reasonable and qualified subcontractors and suppliers to perform the works packages. (Herforth, 2014)

Another advantage of the main contract is that, since the BO has already the design prepared once the tendering process starts, the contractors that get involved in the bidding process create a bigger competition for the project. Unlike TKC, which is responsible for both design and execution, the competition for the project is not that big compared to MC because the BO in TKC does not have much influence on the detail planning of the construction and design process. It is also said that TKC are sometimes considered non- competitive because of low implication of the BO. (A Merna, 1990, p. 185)

In some cases, the architect is appointed for the PM's job by the client, which works in favor of the architect, because he/she has an influence on design throughout the whole construction project, giving more income. However, architects are usually not trained to be Project

Managers, which tends to be a huge problem in this kind of situations. (Radosavljevic & Bennett, 2012) The advantage for the client of such an agreement is that designers participating during the whole construction process does not create additional costs in case of design changes, even if design phase of the project is terminated (the execution of this change is another problem which brings additional costs as described in Fig. 4-1: Cost influencing the project outcome).

The greatest disadvantage of the main contract is that, the design process lies under the BO responsibility and in case of design misunderstandings then either BO or the persons assigned by him/her are liable depending on the type of contractual agreement. Nonetheless, once the execution is in progress, any kind of design changes have dramatic impact on the entire cost and time frame of the project. (Chapter 4 PROJECT TYPES)

The advantages and disadvantages presented above are some of the most important ones. The detail information about the TKC is presented in the following lines.

4.2. Design- Build, Turnkey Contract

The term design build refers to both the design and execution of a construction by one firm, meaning that the client enters into contract with one firm only. Because of such request a part of the design-build firms were formed by a general contractor employed architects and/or engineers to provide a full-service. Other companies were created by general contractors using design-build services from a joint venture with an architectural firm. (Levy, 2010, p. 9)

In case of public enterprises, the bidding for such contracts can start after the competitors finish the *scheme design* phase of the project, meaning that the design together with results of needed investigation, detailed plan drawings, profitability and feasibility studies are completed. In case of private projects, the BO should complete the analysis of needs before he starts negotiations. (Sutt, 2011; Herforth, 2014)

When choosing a design-build contract, the total schedule for the project is meaningfully shortened because the *"'build' side of the team can begin to order materials and equipment, engage subcontractors more quickly, and get a jump on construction*." (Levy, 2010) By having a reduced schedule, it means less financing for the client.

Having one firm is entitled for both design and execution of a project then it is easier for the client to monitor and to keep track of the real costs according to the estimations. Moreover, it is also easier for the client to deal with only one firm, rather than hiring separately architect and engineer for the design and subcontractors for the construction. This kind of contract arrangement is suitable for the client especially when dealing with complex projects that require the usage of various building technologies, because the design goes hand in hand with the construction planning, which makes it possible for the contractor to predict the outcome of the project very early on the process. Moreover, the arrangement is most suitable for large technological projects (power stations, gas pipelines, chemical factories etc.) as well as renovation projects. (Sutt, 2011; Bejder, 2007)

According to the Appendix B. Interview with Lars Ørvad Nielsen by mail the developer (BO) has the advantage that *"agreement and settlement is done with only one company plus that the*

developer has usually own advisor on the sidelines, although this is an agreement with a contractor."

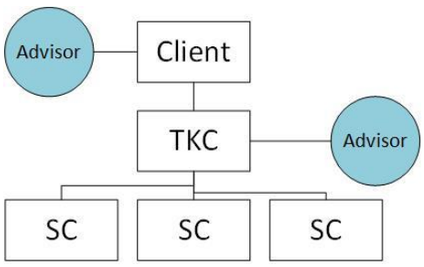

Fig. 4.2-1 BO- TKC organisation

In design –build contracts, the turnkey contractor is usually the one becoming or appointing the Project Manager for the case. In this manner, the Project Manager is responsible for creating a good working environment and a good collaboration with the parties involved in the project, by keeping the client informed of any changes. The client can also make him responsible for administrative procedures of the project such as application for building permit or permission for usage of the building. (Sutt, 2011) Moreover, they can both hire advisors, especially in case of large projects, so guidance is provided and parts of the work responsibilities can be divided. (Fig. 4.2-1)

According to the Appendix B. Interview with Lars Ørvad Nielsen by mail it is highlighted also the fact that TKC: "*provides for requesting the building permit from the municipality coordinate all subcontractors and supplies during the construction. Turnkey -contract is often used for the rather large tasks."*

One of the concerns specified by Sutt in his work is that the quality of the performed work might not meet client's expectations in the end. (Sutt, 2011) Such situation happens mainly because the TKC appoints the subcontractors for the bidding, so that in order to decrease the price and win the competition he/she would choose the cheapest subcontractors/ materials available. Moreover, clients usually desires the lowest price and turnkey projects usually turn out cheaper than the ones executed under the main contract, meaning that TKC do budget cut downs which might result in lower quality of the product.

Advantages and disadvantages of turnkey contracts

The main scope of turnkey contracts is to offer clients complete operational facilities, taking care of all the project phases: design, construction, operation and maintenance. This is a beneficial aspect for either an unexperienced or a familiarised client who is dealing with only one firm since the inception phase of the project. Moreover, the fact that the power is all in one hand, allows a shorter construction time for a fixed cost. For this to happen, the client is not allowed to make changes after the design and construction already started, because this creates misunderstandings for all the project members. (Sutt, 2011; Herforth, 2014)

The lump sum price aspect of a turnkey contract is also considered an advantage because the client is safe and sound in regards to additional costs. Robinson submits "*a turnkey contract at a fixed price where the contractor carries the risk leads to minimal time overruns and cost increases compared with a traditional type of contract."* (A Merna, 1990, p. 188)

In such contract, the number of resources is usually less than the traditional contracts because all the project members are qualified and familiar with the project since the beginning and the division of the responsibilities is more accurate*."* In addition, Bornstein states "*the difficulties associated with sub-contractors, project coordination and the burden on the clients resources are reduced by adopting a turnkey contract."* (A Merna, 1990, p. 188) Having a correct flaw of information in the team creates a good atmosphere leading to the project success.

For a gaining success, it is important for the project management teams to perform the tendering and execution of the contract flawless. "*The number of discrete elements and disciplines requires a Project Manager with the managerial skills and the technical ability to coordinate and manage a multi-disciplinary contract.*" (A Merna, 1990, p. 190)

Some of the disadvantages of TKC it can be:

- The little involvement of the client, because he does not participate expressively to the project phases, as PM has the decision power under the contract. (Sutt, 2011)
- The price tag of a turnkey contract may be meaningfully higher than a traditional form of contract because cost estimations are designed in broad terms without a detailed analysis. (Sutt, 2011)
- The turnkey contract does not allow the standard check procedure as in the traditional form of contract. (GC92, 1992; GC93, 1993)
- *"Turnkey contracts have also been attacked as being non-competitive and producing sub-standard work as they are not policed by an independent party*." (A Merna, 1990, p. 185)

Conclusion to the chapter

The chapter purpose is to describe the advantages and disadvantages in a comparison of the two most important and currently used contractual agreements in Denmark. In the beginning, it is stated the great importance of the proper project development without any kind of design or execution flaws, which can have dramatic impact on the cost and extension of the project. In case of MC agreement, the best for the BO is to assign qualified people for both the design and execution parts, so the implementation is not interrupted because of any process changes. When referring to TKC, the only thing the client can do is to ask for either vast experience or similar projects proposals from the contractor, in order to be sure that good materials and resources are chosen quality and money-wise for the accomplishment of the construction project.

For both of the contracts the responsibilities of the PM are described, depending on the type of agreement chosen. In MC, it is typically the architect or the engineer who acts as the Project Manager for the construction of the specific design and therefore must collaborate with the parties involved in the project. PM acts as a link between owner and contractor in the administration of the construction contract. In TKC, the contractor appoints the Project Manager, who is responsible for creating a good working environment and a worthy collaboration with the members of the project, yet keeping the client informed of any changes. The client can also put him/her in charge for administrative procedures of the project such as application for building permit or permission for usage of the building.

Furthermore, the essential advantages an disadvantage of both types of contracts are stated. According to the data presented in the chapter, choosing a TKC has more advantages than MC, when referring to what is best for the BO (of course it depends on the wishes and type of building), because the design and construction of the project can be commenced by signing only one contract.

In the next chapter the terms of project and change management are included together with what it contains in relation to the changes that can sometimes be foreseen and some other times are totally unexpected.

5. PROJECT MANAGEMENT

In this chapter, the concept of project management is described in order to state the important phases in such an accomplishment and the role of the Project Manager through the main phases for traditional projects.

According to Oisen project management can be defined as: *"[…] application of a collection of tools and techniques to direct the use of diverse resources toward the accomplishment of a unique, complex, one-time task within time, cost and quality constraints. Each task requires a particular mix of these tools and techniques structured to fit the task environment and life cycle (from conception to completion) of the task."* (Atkinson, 1999, p. 337)

Additionally, Lock's interpretation is that project management is a concept, which plans, co-ordinates and keeps track of several activities as parts of a project, while Burke proposes that all these activities should be under a single point of responsibility. Furthermore, Turner added that project management could be described as *"the art and science of converting vision into reality."* (Atkinson, 1999)

Further, there are explained the concepts of what a construction project means referring to the development process and including the main stakeholders which have an interest in the success of the projects.

In the past, 'construction project' meant designing preparation plus the planning of the assigned tasks in accordance with the legislation and technical standards. "*The project was therefore understood as complete documentation, according to which the technical and economic level of the design, its realization plan was assessed and according to which the realization as such took place."* (M. Nový, 2012, p. 190) The connotation of the term means that the construction project is much more than documentation. Besides the administration part, any project within building industry is ought to deliver specified business and/or technical goals in a specifically planned way by performing certain tasks and processes within certain time frame, budget and resources. There is a set of characteristics that can be assigned to each construction project, regardless its uniqueness:

- It is performed by previously planned activities, that have specified start and end dates,
- Activities are performed by using specific, restricted resources,
- There is always at least one goal of the project,
- Each activity is done to serve specific purpose and develop a new output,
- There usually is a budget
- It is usually PM's responsibility to co- ordinate all activities. (Passenheim, 2009)

"Construction management is defined as taking responsibility for the performance of a construction organization." (Radosavljevic & Bennett, 2012, p. 71) The concept is referring to the progression of planning and management of procedures, having a specific goal and a specific cost. Depending on the countries' legislations, this term has been established slightly different in various countries, and several international organisations were formed in order to supervise the progress of the phenomenon.

The largest organisation entitled Project Management Institute (PMI) was initiated in 1969, in USA. It has representations in more than 185 countries of the world and more than half million members. A few years later, in 1989 the PRINCE2 (Project in Controlled Environment) was formed, methodology in Europe, controlled by the UK Office of Government Commerce (OGC). The methodology was updated for the last time in 2009 in order to fit better with the public contracts across the borders. (M. Nový, 2012)

All the organisations have the same principles and objectives such as:

- *"To explain the basic concepts and principles of project management.*
- *To describe methods and techniques of project management.*
- *To participate in creation of literature and project management legislation.*
- *To specify description of a Project Manager's profession.*
- *To certify Project Managers and to organize project management courses.*
- *To present program products for computer support of project management.*
- *To create platform for sharing the knowledge on international level.*
- *To build professional community of Project Managers."* (M. Nový, 2012, p. 190)

As it can be deducted, the concept of project management gained a lot of importance over the years, which lead to the creation of previously mentioned organisations. Those keep up with standards all over the world providing the managers with knowledge gained from various projects about successful techniques to be applied in their work. Therefore, it is crucial for each project success to be under the supervision of certified, qualified Project Manager.

5.1. Change management

Change management (CHM) in construction industry is part of project management (PRM) and it refers to any additions, omissions or adjustments within the project processes, considering all internal and external factors that influence such development. Usually, unexpected changes have a negative impact on the project because they most lead to delays or increased costs (see Fig. 4-1: Cost influencing the project outcome) for either contractor or owner, depending on the type of contractual agreement. (Bon-Gang Hwang, 2012)

There is no specific time for changes occurrence, so they can arise at any stage of the project, having a significant effect on the project in general. Moreover, some of the changes within construction are unpredictable, as related defects are hidden and cannot be observed in the inception stages. This means that significance of those is hard to measure and most likely lead to disputes between the project parties. It is best to find any adjustments in the earlier stages, so they can be corrected easily, minimising the conflicts possibilities. On one hand, the degree up to which changes can be remediated is frequently determined by the *project nature, industrial type, project complexity, project size, contract methods and the level of experience of project participants.* On the other hand, preventive measures must be considered in such cases in order to manage changes in a proactive and systematic manner, safeguarding a prosperous implementation of a project. (Bon-Gang Hwang, 2012)

In a few words, change management is a comprehensive topic, which tries "*to forecast possible changes, identify changes that have already occurred, plan preventive impacts and coordinate changes across the entire project."* (I.A. Motawa, 2007, p. 368) . According to the *Changes and*

change management in construction and IT projects (2011), CHM is considered one of the most important practices of PRM.

5.1.1. Sources, reasons and effects of project change

According to Isaac and Navon (2008), the main reasons of change within construction projects are: *delays, cost overruns and quality alteration* from the contractual agreed requirements. In this aspect, the parties (usually, either client or contractor) that are bounded by the contract suffer money loses in order to keep the project progressing. (Bon-Gang Hwang, 2012) Foremost, it is best to prevent such changes from happening, but in case this is impossible, then root causes must be examined carefully in a well-organized and efficient manner.

There have been analysed the information from three journal articles (Bon-Gang Hwang, 2012; Jan Bröchner, 2011; I.A. Motawa, 2007) in connection to the CHM principles and sources of change. The origin of the surveys included in the papers is from different countries in the world, such as Sweden, Egypt, UK, USA and Singapore. Taking into account the relevance to the Danish construction industry, the most essential aspects are presented and categorised. Moreover, the proposed examples given for each of the factors might not be 100% complete, because change management is an on-going process, so changes always occur leading to new problems, though the most appropriate ones are stated.

According to the above mentioned 3 articles the sources of the changes within projects originate from several factors related to the construction industry and can be divided into internal, external and contractual elements.

Internal factors:

- Project- the project environment is not always the same and uncertainties can always appear which increases its complexity. Among other aspects related to the project, there can be included also the wrong price estimations done by the client's advisors, the contractor or PM, resources unavailability because of wrong scheduling, or the bankruptcy of a project main stakeholder. The PM responsibility is to act as a leader, being in charge of the situation by applying his/hers leadership skills, regardless the contract type agreed upon.

- Organisational – refer to the unproductive communications platforms and ineffective collaboration between the involved stakeholders. Project Manager is responsible for the effective sharing of the information and, depending on the parties involved in the project it might be required to apply a change in the management for a successful implementation. Nevertheless, the success of communication platform is within the good PM duties, but if the external parties do not know how to use it effectively then is beyond PM's area.

- Stakeholders – the most costly factors that have influence on the stakeholders of the construction project are mistakes related to the design. Such mistakes lead to infective design, poor project definition by owners, inadequate pre project planning, inadequate project change management, poor communication among owners, designers and constructors, or constructability ignored in the design process. (Jan Bröchner, 2011) As already specified earlier in this report (see Fig. 4-1), the further the progression of the

project is, the more costly the mistakes reparation is. Depending on the contractual agreement, this aspect can be blamed either on the BO (architect) or on PM.

External factors:

- **Natural unforeseeable circumstances** – it refers to the unpredictable weather conditions that can have negative impact in the site works, leading to project delays. Rainy and winter conditions must be considered when scheduling is performed by the project management team, so the workers' safety on site is not exposed. In Denmark, the storms and rainy seasons are often occurring, so they can be anticipated to some extent, which is why the guidelines on winter conditions are included in the law regulations. (Herforth, 2014; GC92, 1992; GC93, 1993)

- **Legal and government intervention** – new legal requirements or regulations that must be obeyed. It can happen that a law is newly enforced, in such case main project parties, but especially contractor is obligated to be aware of it and he/she has to make sure that the development of the project complies with it, even if this incurs more cost to the project. (Herforth, 2014)

- **Economy** – it includes the fluctuations in tax and interest rates. If the inflation rate cannot be predicted for the cost calculations of the project, then it can have negative influence on the cash flow and material procurement for the construction project. It is the project management team's duty to estimate in an accurate manner such costs.

Contractual factors:

- The client should be aware of the importance of applying proper contractual agreement to the project, so all the required terms and conditions comply with the applicable law. (Herforth, 2014) Nevertheless, there are cases when the contract wording is not precise or *contains errors, omissions and contradictions in specifications*. This aspect highlights the importance of the advisor for the BO, because the advisor is supposed to know the right legal forms, so that the client is protected. Moreover, the unexpected natural occurrences have impact on the project because management requires changes in case those happen. The *force majeure clause of the contract* prohibits from such events having any impact on any contractual changes and the financial responsibility is on the client's side. (Jan Bröchner, 2011; GC92, 1992; GC93, 1993; The Danish Council of Practising Architects (PAR), 2003)

- The construction technology changes fast within the building industry and this has impact on the project. Generally, a construction phase involves several contractors, subcontractors and suppliers that must work together, so that the access and adaptability to technology shifts can be an impediment for the successful development. The elected PM must assure that the team chosen for performing the work is qualified and have the necessary capabilities and resources to adapt. Furthermore, the supplier might encounter changes into the delivery system because of new technology appearing compared to the time when the contract was signed. The new developed technology or machinery is a risk and it might incur changes in the production unit, this resulting either in delays or in not 100% exact specification of the agreed product. Yet, the quality of

the product might be even better, but the production time could take longer because of new rules/laws, which must be obeyed. (Anna Dubois, 2000; Bargstädt, 2015)

- *"Changes and change management in contractual relationships can be assumed to be influenced by the degree of tailoring of a contract to a particular context and also by the detail and complexity of the contract."* (Jan Bröchner, 2011, p. 769) Sometimes, when dealing with large constructions, the complexity of the contract might be challenging for the parties involved. In the research paper, *Changes and change management in construction and IT projects (2011)* there is suggested the approach used by Sweden, by choosing standard forms of contracts. Additionally, other studies reveal, that conflicts tend to arise when there is requirement for *a wording of change* within the contractual agreement. It happens because any change from the common rules requires more advanced capabilities from the parties involved in the project (most likely the contractor). Moreover, the responsibility partition is changed between the parties who bear the cost for the particular change. (Herforth, 2014)

By presenting, the most relevant changes that have impact on the project development it can be agreed that is critical for project management team to deal practically with such unexpected variations and to be aware of changes likelihood of happening. Several of the most important undesirable effects of changes are summarised in the following lines:

- *Increase in project cost and in overhead expenses,*
- *Recruiting New Professionals*,
- *Quality degradation*,
- *Decrease in labour productivity*,
- *Delay in procurement process*,
- *Rework and Demolition*,
- *Delay in completion schedule.* (Bon-Gang Hwang, 2012, p. 819)

According to the data presented above, CHM is a PRM practice that finds solutions for changes occurring during projects. The main idea is to find a way to minimise the impact of such changes, so the progression of the project is not interrupted for too long. CHM is focused on sustaining the three essential factors compressed in the Iron Triangle: cost, time and quality. Moreover, it includes also the identification, planning, implementation and coordination across the project between all stakeholders. (I.A. Motawa, 2007; Jan Bröchner, 2011)

Generally, erratic CHM process leads to tension, anger and miscommunication within the project parties that can influence undesirably the project development. In order to fructify this process, the capabilities and leadership skills of the PM must be impeccable and innovative which is further elaborated on in Chapter 7 FEATURES OF A GOOD PROJECT MANAGER. Using the combination of the personal characteristics together with the knowledge from past experiences, he/she must accomplish the objective of an effective change management system. Yet, the literature about CHM is mostly channeled on the identification and recommendations of how to manage changes within the project life cycle, without explaining or guiding the project stakeholders through this process. Besides, there is a clear necessity in the construction industry for the research work to devote more attention *"to modelling the dependent data or simulating the iterative cycles of concurrent design and construction that result from unanticipated changes and their subsequent impacts on project performance"*. (I.A. Motawa, 2007, p. 375)

6. ROLE OF PROJECT MANAGER

Project management in building industry is a very complex issue. Procedures involved are unique and have to be adjusted to each project, depending on the size, team, time and budget frames and tasks to be performed. Therefore, it is safe to say that the industry is project- based oriented. The execution of any construction project is done by bringing together several independent teams, usually for short periods of time, in order to collaborate and meet project's requirements. The process is usually connected with an extreme pressure, due to tight deadlines, budget demands and the fact that participants are unfamiliar with each other, making it difficult and hard to predict management- wise. It proves that it is very important that the managing side of each project should be done by well-selected people who are prepared for such a challenge. (Atkinson, 1999; M. Nový, 2012; Sutt, 2011)

6.1. PM role in MC

In the Main Contract, the BO hires an architectural or engineering firm to produce a complete set of plans, provisions, and specific project requirements. Generally, BO makes two independent contracts with design company and the contractor and further in the process, one member from the design team (either Architect or Engineer) turns into the Project Manager. (Sutt, 2011)

Even though it is still one of the most common contract arrangements, the rules about it do not state how to select the Project Manager who is usually chosen by the client. (Sutt, 2011) There is no difference between public or private projects, because the choice of PM is always on client's side. The fact that the client selects the PM has a big influence on the project performance, because he/she is responsible for creating the time schedule for the construction together with all the administrative work and costs supervision and ideally should be in good terms with the contractor. (Sutt, 2011)

In reality, BO is usually influenced by Advisor's or Architect's opinion about who should be a Project Manager, due to the fact that they performed work for him/her before and in case the BO is satisfied with the work, they already have built the trust. (Manu, et al., 2015) Moreover, PM has the contract with the BO and should act towards his/her best interest, by not making decisions that are advantageous to any other involved party. It is especially important if PM was chosen with prior recommendation of Advisor or Architect. There is a high risk when selecting the Project Manager without any prior recommendation, because if the parties are unfamiliar with each other, they do not trust each other, leading to decrease of efficiency in the whole project. The concept of the trust between parties is explained further in this work, in Chapter 7.3.4 Trust as an important part of the construction project.

On the other hand, the architect might influence the BO in a way so that he becomes the PM himself. Such situation is very beneficial for the architect because of additional profits during the whole construction process. Additionally, design team ensures the good esthetics quality of the product. On the other hand, there is a number of disadvantages of such arrangement such as:" *problems caused by the design may create tensions between designers and contractors; designers' lack of knowledge of manufacturing and production processes may cause inefficiencies; the project may well be subject to regular design changes which interrupt*

efficient manufacturing and production." (Radosavljevic & Bennett, 2012, p. 14) Disadvantages of such arrangement clearly show that it does not work in favor of efficient project management, meaning that construction projects under main guidance of architects are likely to suffer from cost and time extensions.

Even if PM should act at the BO's best interest, he/she does not have a decision- making power on its own, each action has to be consulted and agreed upon with the BO, which makes the process of applying changes more complicated and time consuming. In case of any disagreements between parties or design/construction errors, delays are unavoidable, bringing vast losses to the project.

6.1.1. Tendering process in MC (in general)

During the design stage, it is more probable for the BO to have an architect prepare the bid documents, receive the bids, and advise the owner on contractor selection. This is usually the inception of the process for collecting the necessary information in preparing the first draft. Moreover, the architect does the analysis of the proposals submitted by the bidders and the project finance assistance including details and instructions that must be provided for the potential contractor bidders. Then Project Manager (previously Architect or Engineer, part of the design team) is selected after the contractor's bidding (public projects) or selection of the contractor (private projects) (Levy, 2010; Herforth, 2014)

In case of public projects, contractors have to state their offer and it is PM's obligation to contribute in preparing it. However, the price given by them is not a sum of subcontractor's offers together with their own costs but is just an assumed price, based on their experiences. It happens, because subcontractors are aware that in case they provide their solutions and prices to the MC for his competition, they are prohibited by law rules from competing in the second bidding, which happens in order to select subcontractors. (Herforth, 2014) For this reason, the price given by the MC in the public tender is rather uncertain.

6.1.2. PM role during contract

Besides basic responsibilities associated with PM's initial profession (depending on who is chosen for by the client to manage the project), the PM is responsible for contract administration services, including *periodic onsite visits during construction, full-time onsite project representation, contractor payment requests, testing and inspection services, quotation requests, and change order reviews*. (Levy, 2010)

One of main Project Manager's responsibilities is the cost supervision of the whole enterprise, meaning that PM has to make sure that the MC together with his subcontractors perform the job within the budget, especially when the cooperation between the subcontractor and the contractor does not go the way it was originally planned.

Generally, the organization of the MC makes it possible for the PM to do the job well only in case of smooth and efficient collaboration between all the parties involved in the project, which is achieved by establishing a number of contract between parties, which requires lots of administrational consideration. "*Indeed, the significant key to success of the separated contract rests in the setting out of precisely what is to be built and how executed, preferably developed using 3D/VR (Virtual Reality) and IT, leaving as little undecided design as possible*

to feed through to the construction phase." (Harris, et al., 2013; Bargstädt, 2015) The parties have to have a common goal and work for the best interest of the project as a whole, not for their own, particular one. It can be assumed that all the parties base their work on mutual trust and cooperate well, which more likely to happen in case of private projects, when the tender procedure is not demanded. Otherwise, the results of the process can be far from successful due to difficulties in communication and various interests of independent parties.

6.2. PM role in TKC

According to Freeman, the definition of a Turnkey Contract is the following: *"turnkey preparation of a facility means that a single contractor acquires and sets up all necessary premises, equipment, supplies and operating personnel to bring a project to a state of operational readiness. All the customer needs to do is turn the key to begin full and effective usage of the new facility. Sometimes the contractor continues to operate the facility for the customer, in other cases the customer assumes operational control. Turnkey facilities are appropriate for customers who are unable to perform or wish to avoid their own sub-contracting for ordering and testing components acquired from several vendors. Recruiting, screening and training a highly specialized and sensitive task. A Turnkey Contractor is compensated either through surcharges on each item or service procured for the facility or by a commitment in advance to a fixed price."* (A Merna, 1990, p. 183)

6.2.1. Tendering process in TKC (in general)

The tendering process in a Turnkey Contract starts with inviting contractors to submit an offer for both the design and construction of an establishment. The bid should include also commissioning and handing over protocol and sometimes the maintenance and operations process for a certain amount of time depending on the client's specification.

Usually, the offer price is usually as a lump sum and this means that the client uses a one-time payment for the total work agreed in the specifications, but sometimes there can be included as extras, other works the TKC should perform (this can apply for private owners). In case of public funding and price competitions then the bid price cannot be changed. Economically wise, the value of a lump sum is normally less than interim payments every month or after parts of the work are done, because the payer is asked to provide more funds up front at once without paying interest for the bank every time money are required. When dealing with large contracts that span over a long period, sometimes the bids received by the client are above the estimated budget. In this case, if there is a time lag of 12 months then The Consumer Price Index (CPI)[10], can be applied in order to equilibrate and be fair in the bidding. (A Merna, 1990)

The client should pay careful attention to the project objectives and specifications included in the offer, in order to receive correct bids. The tender is commonly submitted in two parts: one regarding the construction's specifications documents (technical specif.) and the other about financing and price conditions. If this is the process for submitting the tender, then the evaluation is also performed in two parts, accordingly, starting first with the technical scrutiny in order to see if the design is according to the offer stipulations.

[10] The consumer price index (CPI) is an indicator of the rate of inflation in the economy because it measures changes in the cost of maintaining a particular standard of living. (legal-dictionary.thefreedictionary.com)

The TKC is free in choosing the design and execution methods according to the offer requirements, which means that he/she tries to make the best choices reflecting the expertise and specialisation "buildability". Moreover, this aspect is beneficial for the client also, which has more flexibility regarding *time, cost and performance choice,* in relation to the traditional contracting form. Although according to the article *Project Managers and the use of Turnkey Contracts*, "it *has been argued, that Turnkey Contracts inhibit the clients' ability to control costs, quality, performance and constructional details."* (A Merna, 1990, p. 184) This is the reason why, some of the clients prefer to have internal project management teams, which make sure that the project development is on track, especially when dealing with large projects. The client is allowed to slightly change the scope of the works, but he/she cannot change the contract. (A Merna, 1990)

Being a TKC is a huge responsibility and there are not many companies that engage in such projects because of the lack of the resources and skills, therefore, some of them link themselves with others forming joint ventures to be able to win such large projects. The joint venture approach is not always the best decision if the companies do not coexist and collaborate, this leading to disputes between the partners because of dividing the responsibilities unethically. In addition, this usually has negative influence for the project in cause.

As mentioned in Chapter 3.3 Contract agreements, there is no law about the contracts in Denmark, especially typical documents for the Turnkey Contracts, except the GC's. Although, there are some main bullet points that should be included: Invitation to Tender and form of Tender, form of Agreement and Performance Bond, Special requirements, Contract and Specification. The Contract is the most important point because it is the one binding the parties to the project realisation. Second most essential is the Specification, as it contains all the description of the client requirements including materials specifications, design of works, civil engineering, deadlines, milestones, draft cost estimations and extra provisions. By receiving all these offer stipulations, the TKC should be then able to identify and price tag all the items necessary. According to the article *Project Managers and the use of Turnkey Contracts* the minimum information needed by the TKC can be:

- The localisation, the aimed goal and limitations related to project;
- The private resources of the client, meaning the services client can execute on his own or possessions that could influence the cost of the enterprise together with plans of client's expansion in case those exist;
- Information upon the current state of the facility that the project is supposed to be executed on and the idea for its future usage;
- Minimum technical standards;
- The plan of development of local neighbours of the project area that could influence the performance of facility;
- Details connected with deadlines and punishments for delays;
- A basic acceptable cost frame;
- *"Project life span, operation and maintenance, labour rates and number of personnel required, consumables and unit costs, administrative and civils maintenance and spares to allowed for, plant replacement and allowable down time."* (A Merna, 1990, p. 185)

Depending on the client's requirements, there might be needed extra documentations for the particular parts, but he/she is responsible for functional deficiencies related to the specifications. Moreover, the client is also responsible to make sure of the correct warranty procedures and to safeguard that they do not protect only the contractor.

6.2.2. PM role in tender preparations

When receiving the inquiry the TKC is scrutinizing the documents in order to see if it is worth engaging in such a project. The buildability of the project depends on the client's specifications, which must be clear and unambiguous for the contractor to fully understand them. TKC must provide the client with a demonstration about why he/she should be chosen, by stating previous experiences and similar projects. Moreover, the contractor needs to indicate "*innovative schemes, good marketing skills, management and co-ordination capability, control of suppliers and subcontractors, good presentation and reporting and excellent communication skills*". (A Merna, 1990, p. 185)

The next step is to appoint a Project Manager who has the adequate managerial and leadership skills, being able to collaborate positively with each party, for each stage of the project realization. In addition, PM should have technical skills to scrutiny the documents and to interpret better client's specifications. Sometimes, there is only the client and the TKC as the only main parties in a project, without any advisors then the PM communication skills should be immaculate, as being the only link between those two. PM is expected to be a good coordinator, to be able to organize the work packages according to their importance and to allocate the right amount of the resources to the tasks.

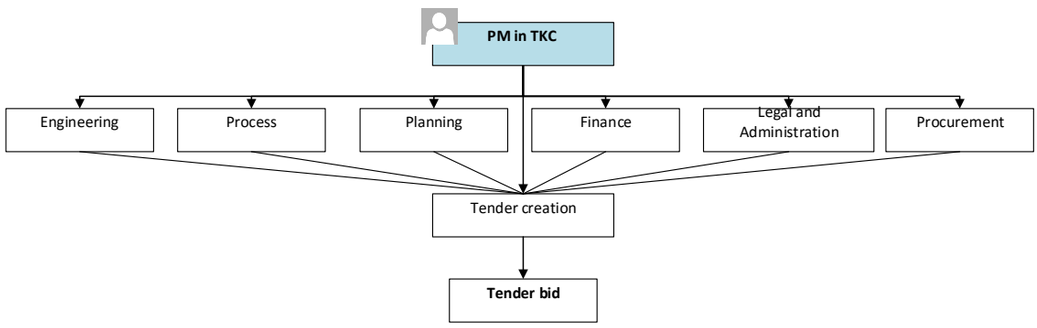

Fig. 6.2.2-1: Project Managers' role in turnkey tender preparation (A Merna, 1990)

The following point is then to prepare a process design including the price tag for the works. In this procedure each of the PM team member shown in Fig. 6.2.2-1 would advise the PM regarding the risks and benefits incorporated in the project cash flow. There must be considered, all the cost required for preparing the design process to be included in the bid, so the client pays for it. On top of this administrative cost, exists also the profit margin for the PM and his team. When dealing with public tendering (contractors from different countries), then the cost should include also the "*additional pricing of insurances, transportation, local decrees, foreign currency payments, import duties and local working conditions. Often specifications and contract conditions will contain items that the contractor cannot readily price without investigation.*" (A Merna, 1990) Moreover, there must be taken into account risks associated with economic, political and geographical factors to be priced and included as a cost, because if a Turnkey Contractor is not aware of such aspects, then the chance of submitting a competitive tender is far-off.

6.2.3. PM role during contract

The essential aspect during the project start-up, is for the PM and his/hers team members to collaborate constructively in fulfilling the project goals and success. PM's time is allocated for both office and site works because he/she is responsible for the design and execution of the project during its development. The duties of the PM and site manager are stated in a post-tender stage so there are no decision-making misunderstandings on site regarding how works should be performed.

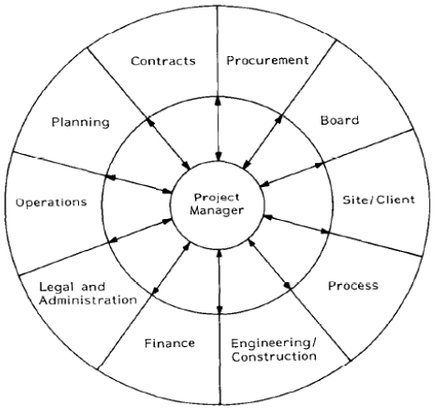

Fig. 6.2.3-1 Project management organisation

In the start-up phase, the information concentrated in the bid must be converted into practice and the PM must coordinate the design of all aspects including architectural, engineering, civil, mechanical and electrical works plus the respective equipment that needs to be procured on site. Moreover, there is required detailed information for the site fabrication, erection, construction, testing and commissioning for all sections of the works. During this process, there are held meetings between PM, the client and other members in order to discuss the construction timeframe cost in relation to the tender description. Besides, PM works as a liaison between the client and the construction development and he/she must keep the client on track of the process for monitoring and to make the interim payment schedules based on the contract agreement. In addition, project administration include also: *"scheduling of all project phases, budgeting, resource planning, project reporting, project documentation, quality control, design, purchasing, manufacture and delivery."* (A Merna, 1990, p. 187)

As displayed in Fig. 6.2.3-1, the interdisciplinary project team usually contains staff from the different sections: planning, process, finance, procurement, legal and administration, contracts, operations and engineering. These members must work collaborate well for a successful project implementations and they must be comfortable with the project steps. The Project Manager is the one responsible to make sure that in case of any changes because of the client new wishes, economic, social or political deviations, the team members are aware. The same applies also for the suppliers, which must state the validity of sub-contracts. (A Merna, 1990)

In the interview conducted with Lars Ørvad Nielsen (see Appendix B Interview with Lars Ørvad Nielsen by mail), he specifies responsibilities of Turnkey Project Manager as a number of activities that have to be done from different categories. He sorts the responsibilities in particular groups such as:

- *Overall management of the project*
- *General project management*
- *Economy*
- *Customer*
- *Time*
- *Quality*
- *Jura*
- *Work – Safety* (see Appendix B Interview with Lars Ørvad Nielsen by mail)

The very first point relates to setting general goals of the project for all the parties included accordingly to client's wishes and planning the realization of those during project phases. The second one refers to people management, therefore selecting appropriate partners for cooperation, project organisation by meetings or correspondence with involved parties, proper responsibilities delegation etc. The third one connects to the budget management, thereafter the TKC must prepare the financing plan for all project stages and be aware of alternatives available on the market from the economical point of view. Being well prepared in this area is very important in creating trust between TKC and the client and it is very important that the manager informs the client about all the financial decisions indicating risks and opportunities. The group called Customer includes all the responsibilities connected to the client such as identifying his needs and expectations, organising events (e.g. project meetings or hand over etc.) and making sure he is satisfied by the quality of the product he receives and happy with the received service.

In the group Time Lars Ørvad Nielsen refers to preparation of realistic time schedules for the whole enterprise, when the quality one he emphasises the importance of selection of proven and simple project solutions in order to minimise risks. Moreover, this part includes also the risks management on each phase of the project. Jura refers to the knowledge of contract law applicable in the industry and work-safety to ensuring good working environment to all the employees.

Furthermore, in order to fulfil the project goal, PM is responsible to allocate worthy resources during both design and construction process, to allow handing over to happen. He/she must run down workforce as parts of the work is finished and then assign new resources for the future tasks such as commissioning and operation and maintenance, making sure that the performance guarantees are met, otherwise he/she is not getting paid.

The Project Manager is also accountable to create the operational manuals for the client.

Site manager

As mentioned before the Project Manager and Site Manager(SM) must join forces for a successful project development, without having any kind of conflicts on site which could lead to pointless delays. Their tasks are distributed accordingly into a post tender, where they assign the responsibilities. There must be mentioned that, SM should have delegated authority on site to make necessary technical changes so delays are minimized.

The most essential job for the SM is to supervise the works, materials and resources. According to the article *Project Managers and the use of Turnkey Contracts, "the site management team is often a mirror image of the head office team allowing a flow of information between each discipline via the site manager and Project Manager."* (A Merna, 1990, p. 187)

In order for the SM to perform the work and for the head office and PM to be able to track his/her work, SM needs a recording template where all the information is collected. SM is also in charge for the minutes from the meetings with the client, which are usually held every 2 weeks. At the meetings, SM is presenting the flow of the construction quality including any other matters related to the process.

Conclusion to the chapter

In this chapter, the roles of the Project Managers for MC and TKC are presented including also a small introduction of the site manager's responsibilities. The roles are categorised into tendering and contract processes within a construction project development. The essential differences regarding PM responsibilities are connected to the fact that acting as a MC, the PM does not have any influence on the design (unless he/she is an Architect appointed by the Client to be a PM), therefore his main role is to simply execute what is agreed on with contract, trying to avoid delays.

Considering the TKC, the case is broader, because the PM is responsible for negotiations with the client, therefore he has to be aware of all the solutions available on the market, the quality of those and price, in order to satisfy client's wishes which is usually connected to receiving the highest quality by the lowest price. In the same time the TKC has to perform all the other tasks of the PM regarding the execution of scheduled tasks assuring the collaboration between parties and great working environment.

For this reason, authors conclude that acting as a Project Manager in Turnkey Contract is more complex and challenging than acting under Main Contract.

7. FEATURES OF A GOOD PROJECT MANAGER

After the role of the Project Manager is explain in the report, the next step of the authors' research is to identify what characteristics are necessary to be successful in this profession. Initially, the authors wanted to bound the research over a good project manager only to the ones working on Turnkey Contracts, however, due to the fact that the concept is relatively new in the construction industry the sources are rather limited. Therefore, in order to identify what makes good project manager in Turnkey Contract it is assumed that the sources relating to successful Project Manager's in general are applicable, completed with the statements from performed interviews.

The chapter starts by explaining the difference between the Project Manager and the Project Leader and styles of leadership applicable in both cases. It continues with changes brought by the reformation of the industry, revealing development of the Project Manager's role during the years. In the beginning there are stated the main factors which contributed to the formation of the new competences required for a successful Project Manager, followed by his/her prominence into the project effectiveness.

Further in this chapter there is an analysis of two articles related to main characteristics of good Project Manager. In order to validate findings from those articles the concept of Emotional Intelligence is also investigated, together with explanation of anger issue in the industry and trust creation concept. Due to the fact that this particular subchapter relates to research question of the report there is a separate conclusion, in order to emphasize the most important findings.

The chapter also includes the explanation of the project success and project effectiveness, together with indications for evaluation of enterprises. In the end, there are included more journal articles in a form of one another response, in order to validate the theoretical investigations: "*whether the competence, including personality and leadership style, of the Project Manager is a success factor for projects; and if different competence profiles are correct for different project types"* (Müller & Turner, 2005)

7.1. Leadership within management

"Construction managers exist because it has been decided that specific parts of the essential construction actions should be delegated to specialist managers. This does not in any way modify the vital principle that construction performance is the responsibility of everyone involved. Managers, like everyone else, are responsible for the actions delegated to them; an important part of this is being responsible for the way their actions influence the performance of all the other teams involved." (Radosavljevic & Bennett, 2012, p. 71)

The quote above indicates that Project Managers of construction projects are responsible and are supposed to act only within the area of their appointed duties. Thus, it is a vital to recognise when the role of Project Manager ends and the Leader takes over.

In this paragraph there is explained the difference between the manager and leader responsibilities, in order to present how those roles very in characteristics and the reasons why a successful Project Manager should have leadership skills as well. There are times when the

manager can lack the motivational characteristics of a leader, but this can happen also to the leader missing the planning and coordination of a manager.

"Management is the skill of getting people to do something that you want them to do because you want them to do it and leadership is the art of getting people to do something you want them to do because they want to do it." Sal F. Marino (Simpson, 2012, p. 7)

The Project Manager has as the main responsibility to plan, direct and integrate the hard work of the parties involved in a project in order to achieve the same goal. Moreover, "*PM is also responsible to gather and integrate persons for different functional areas such as the contractors or other external parties. Traditionally, when referring to the term Project Manager, he/she is the person focused on delivering a product or a service at an agreed cost within a certain timeframe.*

The leader's main ability is to inspire and direct a group of people or an organization, by creating a change in the traditional way of doing this. The leader provides a vision, a new path for the process, focusing more on the outcome rather than income of the work." (Simpson, 2012, p. 10)

Manager	*Leader*
Manages change	*Creates change*
Control	*Commitment*
Focused on roles	*Focused on outcome*
Conforms	*Innovates*
Transactional	*Transformational*
Concerned with stability	*Concerned with energizing*
Execution	*Ideas*
Problems are problems	*Problems are opportunities*
Likes control	Is comfortable with risk
Works in the system	Works on the system
Coordinates efforts	Inspires and energizes
Follows orders	People follow them
Detail	Direction
Tells	Sells
Results focus	Achievement focus
Uses established paths	Creates new paths
Provides resources and goals	Provides vision
Processes	People
Formal authority	Personal charisma
Subordinates	Followers
"what"	"why"
Organises people	Aligns people
Control	Passion
Initiates	Organises

Fig. 7.1-1 Difference between the Manager and the Leader (Simpson, 2012, pp. 7-8)

In Fig. 7.1-1 are stated the most important skills and responsibilities, managers and leaders should possess. By creating this comparison, it is then easy to observe in which aspect one is different from the other, however, the list can be continued depending on the individuals personality and working environment. Most of the abilities for both types can be enumerated under transactional style for the manager and the transformational one for the leader, this being the reason why they are highlighted in Fig. 7.1-1.

From the point of view of leadership styles reference, the transactional one can be confounded with a managerial style sometimes, this being the reason why transactional is listed in the manager column. In such case, the relationship between the manager/leader and the employees is one based mostly in a form of a reward. Moreover, if the subalterns do not follow the orders they can be penalized if the work was not performed up to the standards. This type of leadership is defined by short-term goals, meaning that, the innovative thinking and the self-development is not very often seen. (Müller & Turner, 2007)

Transformational leadership represents the innovative type of leadership, by realigning anticipations, goals and values in a team or in an organisation. Moreover, it is based on creating a change from the ordinary routines, focusing on the welfare of all the parties involved.

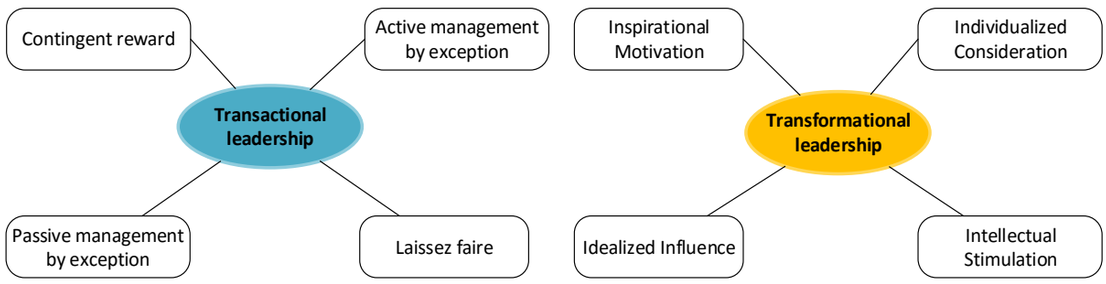

Fig. 7.1-2: Difference between transactional and transformational leadership styles (Simpson, 2012, pp. 10-11)

The transformational leadership has four main areas, which can be observed in Fig. 7.1-2. *Individualized consideration* is the leader's ability to focus on each person separately because each individual has different needs, desires and skills. In this manner, the support and empathy is shown, having further impact on the self-motivation of the employees. *Intellectual simulation* represents seeing the big picture rather than focusing on the details. The employees are encouraged to be creative and to find innovative solutions and the leader's job is to cultivate such thinking by nurturing them. *Inspirational motivation* is the capability to inspire a positive attitude by seeing the half-full glass rather than the half-empty one. The leader must spread confidence and motivation, directing the team on the right track. *Idealized influence* means gaining the respect and trust among employees who consider the leader as an archetype by following his/her steps. (Müller & Turner, 2010)

Transactional leadership is also formed by four elements. *Contingent reward* representing the means and rewards used in order to make people do what they are supposed to. *Active management by exception* reflects the monitoring and controlling process in order to ensure that the expected goals are achieved. On the contrary, *Passive management by exception* is focused on the punishment and correction methods in case the work is deviated from the actual course. The last one, *Laissez faire*, represents the leaders' indifference for the team members' personal needs or problems. (Simpson, 2012)

After introducing the transactional and transformational concepts in order to differentiate the managers' work and skills from the leadership style, the next step is to demonstrate if the Project Manager's leadership style is considered a success factor by the literature. This concept however is further described in the report (7.4.2 Leadership practices vs success of the project), after introducing characteristic of a good PM and explaining what the success of the project mean.

"Leadership styles are proved to predict project success by investigating the engineering projects, information projects and organizational projects." (Müller & Turner, 2007) The success of the project is an overall responsibility of all the parties involved, however, it is a Project Manager who takes care of most of the processes and leads people towards achieving previously set goals. Therefore, it is extremely important for this profession to find the balance between two mentioned leadership styles, however the main focus of the manager is to get the execute the project within set frames, not to help participants develop their skills along the way. The main responsibility of the PM is to get the job performed, which is best done by having just right approach to the co-workers, thus previously mentioned balance should take place. The approach however, should be adjusted according environment of each project, considering the contract set up, team(s) involved, project size etc. (Müller & Turner, 2010; Simpson, 2012)

The customized approach towards project management is an obvious, yet not sufficient factor in achieving most from the Project Performance. The work of the PM in construction industry is very complex, therefore, there is a set of tasks that have to be fulfilled in a right manner in order to get desired goal. However, due to rapid changes in the Building Industry the requirements for the PM's work execution have been changing over years, which is the concern of the next chapter.

7.2. Reformation of Project Managers' due to according to changes within the Building Industry

During the years, starting from 1980, the construction and engineering industry has been changing because of new trends and factors being examined, introduced and documented. Additionally, depending on the companies' sizes and strategic implications, the challenges in the construction industry had also impact on the organisational and managerial approaches. For some firms, the challenge lies in their ability to maintain a long-term sustainable competitive advantage, while for others, it is in their ability to develop and implement organisational strategies that enable them to manage a greater number of projects. Hence, superiority in project management becomes fundamental. This leads to new tactics used by the companies in order to have good collaboration between parties and execution in projects significantly affecting Project Manager's work in general. (Schaan & Navarre, 1987) Within this subchapter, the main factors influencing the reformation of requirements are enumerated and elaborated on, in order to give a background to why the PM's work is demanded to be performed in certain, specific way. (Kristiansen, et al., 2005; Simpson, 2012)

The Fig. 7.2-1 presents the most important factors, which contributed to changes and challenges faced by both, the building industry and the inside management of the construction companies.

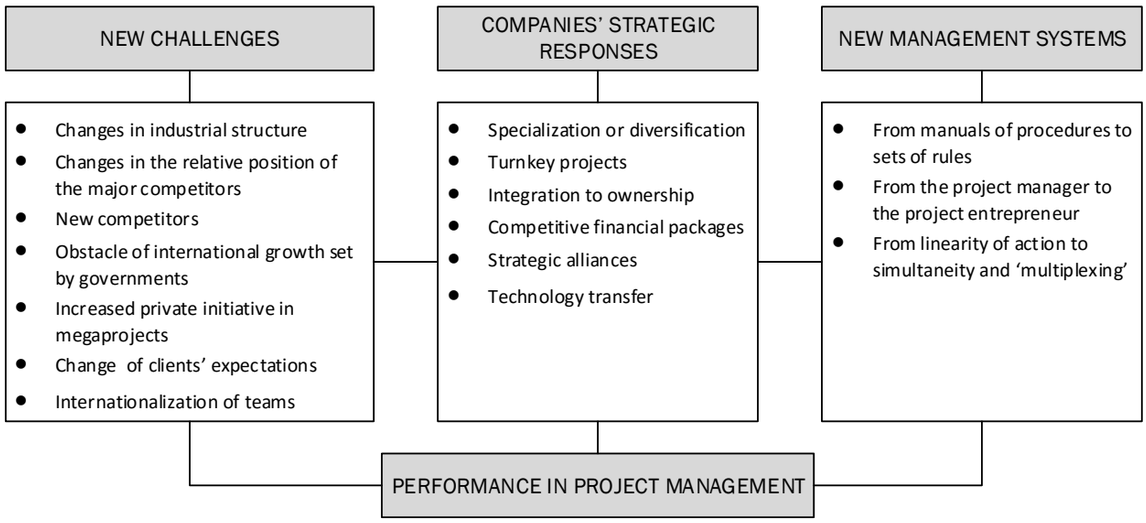

Fig. 7.2-1: Reformation triggers and responses of the industry (Schaan & Navarre, 1987, p. 239; Kristiansen, et al., 2005)

As it can be observed from Fig. 7.2-1 there are three main assemblies, which had a substantial impact on the transformation that contributed to the performance in project management. Schaan divides those into three categories: new challenges, which appeared through the years, companies' strategic responses to them and the new management systems for the internal organisation of the firms. For each of these main ones, there are further described only the most important factors that are relevant to the study case. (Kristiansen, et al., 2005)

New circumstances influenced the drastic change within the Danish Building Industry, such as the economic crisis, the client's reformed expectations, internationalization of project teams, and appearance of Turnkey Contracts, joint ventures or partnering arrangements. Moreover, there must be taken into account another relevant reason for a change in the industry, namely, the fact that in the beginning, the Project Manager had no experience, starting the work straight after gaining education, meaning that he/she had knowledge based only on theory, without any real life projects practice. For this reason, by summing up some of the most recognizable factors, the theory that was studied in schools was transformed and applied to the changed requirements, setting new guidelines fitting the stakeholders' needs. (Schaan & Navarre, 1987; Müller & Turner, 2010; Kristiansen, et al., 2005) Due to the reformation of the industry, the role of the Project Manager had to be adjusted, in order to follow the progress. The most valid factors that had an impact on this adjustment are elaborated on below.

Changing client expectations

Part of the new challenges facing the building industry is the fact that the client has changed the expectations having more wishes such as: 3D models for the proposal, different kind of computer based simulations, personnel that is more qualified, higher quality expectations and even more implication into the projects either by using new technologies or by new contracting concepts. Some of the reasons that contributed to such changes are: *pressure for speed, pressure on financing and the new competitors.* (Bargstädt, 2015)

Pressure for speed refers to the aspect that, before it was easy for the companies to prepare the capital on the assumption of stable and predictable growth. Nowadays, because of dynamic changes and challenges the building industry market is hard to predict it. The idea is to reduce the risks associated with anticipating errors, meaning to reduce the need for the change management (see Chapter 5.1 Change management) in order to perform projects at high

standards and to gain competitive advantage on the market. (Schaan & Navarre, 1987; Bargstädt, 2015)

Pressure on financing stands for the fact that, nowadays the client demands not only the proposal of the project from design and construction point of view, but also the cost estimation. Currently the client tends to demand to know up front what is to be paid for and how much, reducing the flexibility in project budgeting. Relatively large amount of tenders have the lowest price-winning requirement, meaning that contractors have to decrease the price as much as possible. This creates a risk though, because such competition usually means cutting on their own profit and executing projects below the average usual costs, which might lead in a low quality of execution in the end. Leading contractors tend to establish long lasting relationships with subcontractors in order to negotiate the lowest price. Moreover, they tend to create their own subcontracting branches in companies in order not to hire a different firm, but execute it themselves, which reduces costs and maximises their own profit. (Sutt, 2011; Herforth, 2014)

New competitors have always been a reason to be kept in mind for the organisations, especially in the construction market. Before on Danish Building Market there were only a few leading (more developed) companies that could engage into large projects, but nowadays, high quality and low-cost is a rule followed by other companies as well, which allows them to take part in competitions for such enterprises. This means that new competitors are forcing all the other respectable companies in the industry to follow the same rules, thereby increasing the competitiveness. (Sutt, 2011)

Additionally, CAD and BIM have an influence and accelerate phases, fast-tracking and overlapping projects. Then, because of the new technologies, the estimations are easier to be done and even more accurate. Decentralization can be another aspect that pushed the PM to get involved more and to gain experience in all the important phases in order for a company to reduce costs and to gain success. The success of the project from the point of view of the PM is when there is almost no conflicts, work is done smoothly and each team included in the project earns money (Bargstädt, 2015; Ussing, 2014)

Internationalisation of project teams

Another challenge that is faced by the internal organisation of the companies, focusing on the PM's work and skills, is the internationalisation of the project teams. Parties from different countries having diverse cultural background tend to be difficult to manage. This phenomenon happens due to opened borders in Europe, which makes the exchange of goods easier. Danish Building Industry is still resistant to cooperating with international companies, however it still happens, that members of internal teams have diverse cultural backgrounds. The importance of this factor and PM's approach towards it is further underlined in this work, in Chapter 7.3.1 Project Managers' features. (Schaan & Navarre, 1987; Kristiansen, et al., 2005)

Turnkey projects

The new arrangement for the project set up is a response to the needs of the industry that were revealed due to all the changes in building environment. Companies are more involved now than before in the management of all aspects in projects, from concept to construction and even financing. By taking turnkey projects, typically, firms are able to speed up the design and execution process and to reduce costs (see 4.2 Design- Build, Turnkey Contract). Moreover,

when dealing with a turnkey project, the responsibilities, thereby a necessity for wide range of skills of the PM, due to higher projects' complexity, is increased (see 6.2 PM role in TKC). Therefore, Project Manager of such project acts different than under traditional arrangement, therefore he/she is required to have a worthy experience with working on complex projects, in order to finalize them successfully. This concept is further analysed in Chapter 0 The authors of this report find it necessary to conclude separately upon the features of a good project manager, in order to clarify the findings. The reason for that is that there is a necessity to clarify what features makes the PM good in his/her work.

As previously mentioned study indicate, there is a necessity for specific personal characteristics of a good PM, which have to be combined with certain activities. The list of tasks to be performed by PM on daily basis is connected both to specific activities related to project and to interaction with team members. The lists presented below are the conclusion from the analysed articles together with the interpretation of the interviews conducted with Project Managers by authors of this report, which can be found in Appendix A Interview with Casper Bach Munkholm by mail and Annex B Interview with Lars Ørvad Nielsen by mail.

The list connected to the work performance:

- To execute the project according to agreed specifications and deliver it to the client
- To communicate with project parties in an efficient manner
- To coordinate activities
- To recognize risk areas wand prepare a control plan
- To report the current status of the project to the Executive
- To create the schedule of tasks in careful and realistic manner, according to company quality standards, budget frames and resources availability,
- To ensure the quality and stakeholder's satisfaction,
- To ensure that the health and safety requirements are met,
- To be a chairman of meetings.

The list connected to human interaction:

- To make sure that team members are informed on their tasks,
- To set goals and spread them to the rest of the team,
- To encourage the communication between team members
- To coordinate and make sure of the cooperation between team members and involved parties
- To be a role model and promote and share knowledge
- To ensure good working environment

The tasks from the first list are rather technical and can be fulfilled by having the specific knowledge from the industry. The second list on the other hand is related to the leadership style and the human approach, which is where the concept of Emotional Intelligence applies. Even though the EI concept refers to manipulation of any emotion into gaining the goal it is still connected to list of behaviours that need to be applied in order for the intensions of PM to be received in a positive way by team members.

The list of behavioural features:

- Personal approach
- Trustfulness
- Being goal- oriented
- Flexibility and adaptability

- Proactivity in actions
- Being thorough in all activities
- Being a team- player yet a team leader in the same time
- Self- control

All those points from above are described in detail in the chapter, therefore there is no reason for further elaboration in conclusion. However, the authors of this research create the new order of those features based on the literature used for creating this dissertation and interviews conducted. Personal approach and trustfulness are at the very beginning of the list because those features were the most emphasized in most of the sources. Authors place the self-control in the last place due to the findings presented in the report previously, which suggest that anger expression can be used for creating respect and as a negotiation technique.

The interviews conducted for the purpose of this report were focused on Turnkey Contract organisation. Since the work of PM under such contract is more complex and it demands a bit more than stated before. Due to the interviews the most important factors for being a good TKC are:

- Skills and knowledge in partners selection, meaning having a good overview on possibilities available on the market,
- Due to the fact that he is the only link between the Client and the rest of the team, TKC must gain the trust of the client and perform in a way so this trust maintains intact,
- Being able to get into the 'client's shoes', therefore being good at reading people, their needs and possible intentions,
- Must be able to identify customer's decision patterns and act accordingly,
- Overview in law principle which apply when entering into contracts with subcontractors/ suppliers,
- Being able to prepare the financing plan for each stage of the project,
- Must be aware of different solutions possibilities and price ranges of those,
- Must be extremely systematic in work coordination,
- Should be able to think a few steps ahead and be prepared for the worst-case scenario.

The authors believe that TKC should have highly developed Emotional Intelligence skills and the list above proofs the statement. Most of the tasks listed cannot be performed without the skill of reading people. Moreover, turnkey projects tend to be more complex in execution, therefore the strategic planning combined with channeling emotions of team members into specific gaining specific goals seems to be a great advantage.

The study presented above answer the question who the good project manager is, the next question is whether the good manager of the project is a guarantee of the project success and what the phase 'project success' actually stands for. The answer to those questions can be found in the following subchapter.

Project success versus project effectiveness. (A Merna, 1990; Ebbesen & Ussing, 2010)

From previously revealed groups of factors (Fig. 7.2-1) it can be concluded that, the new requirements lead to new management systems. Those are understood as *"formalization of procedures; linearity in the sequence of activities leading to project conception and execution; a development of the project administration function; normalization and standardization of the Project Manager's functions; plus attempts at maximizing task specialization and coordination of activities through formal scheduling systems."* (Schaan & Navarre, 1987, p. 245) The most significant strategic responses to developing industry are listed in the Fig. 7.2-1 and elaborated

on below. All of them have a great impact on the PM's role in project execution, therefore are valid to the report.

From manuals of procedures to set of guidelines

Starting in 1970, engineering companies were developing their own manuals for performed work, in order to make sure that the execution is according to aimed standards, usually aligned with international ones. The goal of those was to provide the outline of execution from the start to finish, together with indication about how works should be made in order to meet the quality demands and to monitor and control the process on each stage. That means that each procedure happening had a set of rules that had to be followed and documented. However, over the years it was discovered that manuals created at the beginning were not suitable for the progressing industry and changing environment, leading to never ending processes of revision and adaptation, thus a huge amount of paper work was necessary. Such situation was unfortunate for project administration, over years the enormous in volume manuals transferred into set of guidelines, which contained basic principles for successful project management. In this way, there is a bigger flexibility in technologies used on site and the bureaucracy is minimized. (Schaan & Navarre, 1987; Simpson, 2012)

From the project manager to project entrepreneur

In the 70s, the basic demand from the Project Manager was to have a wide range of technical skills and basic knowledge of managerial techniques. The PM was playing the role of the coach for the rest of the team members. Over time, as described above, the clients started being more demanding in regards to the execution of the projects. They became more aware of the processes, therefore more capable of controlling the whole process. For this reason, the greater attention to smooth execution must take place. Moreover, nowadays the PM not only has to control all the phases and activities related to the project but also comply with strategic vision of the company, therefore becoming an entrepreneur. (Schaan & Navarre, 1987; Kristiansen, et al., 2005)

From linearity of action to simultaneity and 'multiplexing'

The typical way of project execution from the past was to start one phase of it after another is completed or at least detail planned, making sure that phases do not overlap. Nowadays, there is a greater focus on shortening the time of the enterprise, therefore, since various types of technologies are available, overlapping of phases and activities became a common practice. Such planning demands great controlling skills from the PM, since the resources and logical order must stay in place. Moreover, it requires a great communication effectiveness in order to reduce risks and keep the process smooth. (Schaan & Navarre, 1987; Simpson, 2012)

To sum up, the factors mentioned above can be seen as both a challenge and a chance for improvement in an organisation. Implementing them in the right manner in a company and educating the PM in such manner that he/she is able to control the situation from the initial stage gives a new set of opportunities to the company. It provides with an opportunity of entering growing market sectors, making the clients happier and more confident in the projects, creating alliances with other firms or sometimes taking advantage of the decentralization.

Nonetheless, since the profession of Project Manager elaborated significantly over the years it follows that the criteria for the successful PM also changed. The topic was thoroughly studied by numerous researchers and the most valid to the report studies are presented below.

7.3. Characteristics of a successful Project Manager

The role of the Project Manager is very complex. Not only does it vary from project to project and the type of contract it is executed under, but the strategy of the company itself has a lot of impact on it too. The Fig. 7.3-1 shows that besides internal organisation of the company, factors such as economic and political forces as well as external project's stakeholders (for example users of constructed building) can have an impact on PM's work and the decisions made in regards to the enterprise. Regardless to the fact that each project is unique and demands personalised approach, certain performed studies show that there are some universal characteristics necessary for the PM in order to be successful in their job. (Rosenau & Githens, 2005; Prabhakar, 2008)

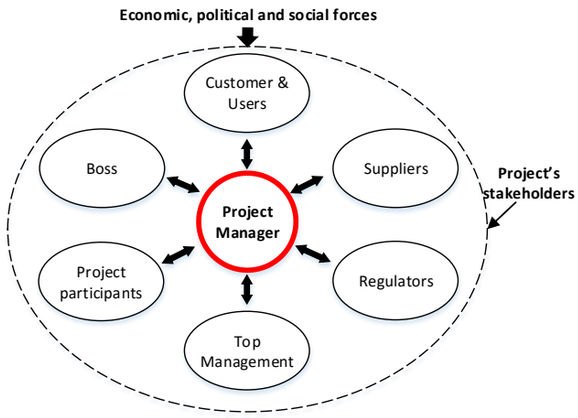

Fig. 7.3-1: Examples of stakeholders associated with Project Manager ***Invalid source specified.***

Therefore, this subchapter presents studies showing the most important features of PM that help in successful project implementation, following by the explanation of the relatively new to Building Industry concept of Emotional intelligence which relates to overall approach of PM. Furthermore, subchapter discusses the anger as an unavoidable part of construction process and its validity. There is also an explanation of importance of trust factor and indicators for its creation between parties. The last part of this subchapter concludes on previously enumerated topics combining the reflections with information gained through interviews conducted by authors.

7.3.1. Project Managers' features

Project management is a general topic within several industries, not only the construction one. Since the topic is so broad, it is only logical that such a study on features of a good Project Manager was done by many researchers with different backgrounds. The article *What practitioners consider to be the skills and behaviours of an effective people Project Manager (2011)* presents the results of one very interesting experiment. Researchers decided to collect data from literature upon characteristics of a good Project Manager and then confront it with statements of selected participants from various industries. Participants had knowledge in project management in their own fields (banking, telecommunications, consultancy and engineering industries) and here was five male and five female included, having different ages and experiences. (Fisher, 2011)

First part of the article discusses a number of characteristics that the efficient Project Manager should have in general. The literature presented in the article shows how the point of view at this certain topic was developing over the years (first source is from 1957, last one from 2007). From the very beginning of the research regarding management, it was clear that the most important skill of all is communication and right attitude towards people about leadership and problem solving. All the sources presented in the paper state that building trust and respect is crucial, along with establishing long lasting relationship in the business. The authors of this dissertation came across many source during the research process underlining this particular factor, therefore it is further elaborated in Chapter 7.3.4 Trust as an important part of the construction project. Another source describes that effective Project Manager has to be flexible in order to easily adjust to complicated situations and be people oriented with strong leaderships and communication skills. The same source says that a good PM is the one who keeps all the involved stakeholders satisfied with the outcome of work (Rosenau & Githens, 2005). Based on this source the article claims, that "*Project Managers need good and effective people skills rather than technical skills to manage the people in their projects.*" (Fisher, 2011, p. 995), which is in the end proven by the whole research presented in the article. This statement aligns to what is stated earlier in this report, since the role of the Project Manager is in general oriented towards working and managing people instead of focusing on technical issues happening on site (see 7.1 Leadership within management)

The second part of the article presents the results gained by interviewing participants face to face. In the paragraph it is stated that most of what the literature sources say meet the reality, however, one of the most important aspects that is revealed by those interviews is rewarding team members for a well-done job. In general, all the characteristics presented in those interviews follow a few categories such as managing emotions, building trust, effective communication, motivating others, influencing others, being culturally aware, leading others and team building. Each of those categories are emphasized also in literature. Furthermore, there are cross-group interviews that prove statements from previous experiments. When people start talking between each other they realize that some of the categories mentioned above are rather characteristics of the leader not the manager. As the result of the whole experiment, there is a map of certain features combined with skills. The list presented below does not have any particular hierarchy, meaning that the order of characteristics is rather random and all of them are equally important. (Rosenau & Githens, 2005; Fisher, 2011)

Skill	Behaviours
Understanding behavioural characteristics	• Honest and open- minded approach to the rest of the team. • Expression of the trust in the abilities of other team members as well as honest concern in case something goes wrong. The caring should come from the true empathy, not only being work related. • Realization of personalities of the crew as well as relationships and interactions in order to use them for the advantage of group work. • Usage of a personal approach to different people in order to be able to deal with multiple types of personalities.
Leading others	• Expression of the interest in innovation and improvement in order to arise creativity in team members. • Usage of appropriate leadership style depending on the situation and people involved. • Execution of the demanded tasks by the team according to demands, done by having just the right approach to specific team members.
Influencing others	• The approach that influences the team and their actions by impressing them in order to get specific or better results. • Clear showcase of the benefits of changes in order to influence the implementation of modifications in a right manner, avoiding any kind of behaviour barriers. • Creation of the certain work environment, which gives an impression of working in a successful team. If such case is impossible to be done, the Manager should find the way to promote such an environment and set it as an achievable goal for the team. • Encouragement towards creation. Focus on team members' values and beliefs in order to create the comfortable environment for discussion and progress. Appreciation of team's development is very important for their self-growth, which leads to overall success of the project.
Authentizotic behaviour	• Care for the team members' needs • Acceptation of members' values and beliefs, such personal matters should not affect the success of the enterprise; however, the lack of appreciation for diversity can lead to serious conflicts and destroy the continuity in work process. • Delegation of the tasks in constructive manner, meaning that such activity has to be done smart according to team's abilities. However, it is always a good practice to encourage the members to take on more responsibilities in order to make them feel more valuable. • Understanding of motivation techniques and adjusting the usage of those to different personalities. • Creation of the environment, which makes the team feel good about what they do and how they work. Overall satisfaction of the team gives stronger motivation to work harder.
Conflict management	• Honesty in conversations with conflict parties in order to establish roots of the problem. • The conflict has to be solved in the way so that the work is done, so that the personal disputes should be avoided. • *Show loyalty, integrity, trust, help and support when dealing with conflicts.* (Fisher, 2011, p. 1000) • Solving the conflict should be based on tolerance and finding the compromise. • *Observe behaviours of team members to sense early when conflicts begin to develop, and then take corrective actions to resolve these.* (Fisher, 2011, p. 1000)

Cultural awareness	• Understand the cultural differences and make them work in your favour in the team. • Express the appreciation and understanding towards such values especially when managing the culturally diverse team. • *Adapt some of other people's own home country behaviours appropriate to the situation when managing people from diverse cultures.* (Fisher, 2011, p. 1000) • Spread the knowledge about cultural differences in the team so that they are aware of potential misunderstandings. When the team is aware of such scenarios it is easier for them to avoid conflicts or at least understand the roots of them, which helps in management.

The article analysed above relates to a few different industries, therefore, in order to validate the data and relate it to the Building Industry in particular another paper is studied, namely the study presented in *Human Resource Management Journal*, providing data on, what makes a good Project Manager. (Cheng, et al., 2005)

Due to the study, two different factors have to be considered when selecting Project Manager, his behavioural competences and his job-task competences. (Cheng, et al., 2005) The main goal of the research was to distinguish the characteristics that differentiate the 'superior' performing Project Managers form the 'average' ones. This can be done after the recognition of certain skills within researched area. Using this particular approach in this paper points that competences are not attributes to a person that performs the job but to the job itself (Cheng, et al., 2005), meaning that the results of the whole paper can relate to any kind of Project Manager in construction industry.

Ordinary, the success of Project Manager's work is measured by the success of the entire project time, quality and money- wise. However, this kind of approach does not provide with the overview of skills of the manager that led to the certain result. For this reason, the study presented in analysed article is based on a different methodology, which in the end shows the overview of competences mentioned above, taking in consideration behaviour aspects connected to the mentality of a person and set of skills related to the way the work is performed. "*The resulting job-task competency model should be specific to the construction industry, while the behavioural competency model could, to some extent at least, be generic in nature."* (Cheng, et al., 2005, p. 27)

The first model is related to job- task competences, meaning, to a set of skills leading to good project execution. "*These are listed in an order reflecting the balance between the chronological importance (essentially the precedence within construction activities) and their general significance."* (Cheng, et al., 2005, p. 29) The article states however, that the list below, is only a framework of reference, since each construction project is unique and demands different procedures and considerations.

Job-task competency model:

"To ensure work is properly considered prior to work starting
To deliver the job to client satisfaction and maintain long-term relationships
To maintain budgetary control and maximise the company's profits
To ensure that the project is completed within the original programme requirements
To ensure that the quality of the end product meets all stakeholder expectations
To adhere to health and safety and environmental standards

To ensure all staff and supervisors are aware of their roles and responsibilities
To ensure that design and other production information is appropriately and effectively communicated to members of the project team
To promote continuous improvement through team learning and development
To promote and share knowledge
To champion company standards and approaches
To input into tendered work and submissions
To chair meetings and coordinate activities
To employ, coordinate and ensure the co-operation of supply chain partners" (Cheng, et al., 2005, p. 30)

The second model relates to personality features of a good Project Manager. The order of the list is created by researchers and it is a result of surveys conducted by them.

Behavioural competency model:

Characteristic	Behaviours
Achievement orientation	Relates to constant improvement approach and drive towards excellence. Project Manager might set standards of work based on previous experiences; however, the goals should always be set towards the improvement, yet aligned to organizational objectives of certain projects
Initiative	Meaning that good Project Manager thinks 'outside the box' and is not afraid of taking proactive actions in order to achieve better results or avoid problems. Thinking outside of the box includes also seeking for even creating new opportunities for project/ project team.
Information seeking	Natural curiosity is a great feature in a Project Manager, not only regarding issues related to construction itself, but also to people and their issues. It is important to make an effort to gain knowledge about people from the team and information about situations happening on daily basis, to have an objective opinion and to have a right approach for the leadership.
Focus on client's needs	Finding the balance between client's requirements and business decisions is a great challenge of each Project Manager. A good one is able not only to do that, but also has a desire to help and serve the rest of the team after decisions are made.
Impact and influence	Relates to certain skills, such as being persuasive, convincing, self-confident. Those features tend to influence or impress the others, which means that those make it easier to reach desired goals. The good Project Manager always knows how to get things done his way.
Directiveness	That refers to the attitude of getting things done. Directive behaviour is connected to a certain style of leadership; however, it also needs balance and a right approach. Respected manager uses such behaviour to coordinate the team within his/her wishes.
Teamwork and cooperation	Good Project Manager is a team- player, cooperates and listens instead of competing.
Team leadership	Relates to making decisions and leading the team. However, it does not mean showing off formal authority, effective team leadership also requires the

	leader to know when not to act authoritatively if they are to get the best out of the team. (Cheng, et al., 2005, p. 37)
Analytical thinking	Refers to detailed understanding of situations, analysing them by breaking them down into steps so conclusions can be drawn from them. By doing so, it is possible to see relationships between problems, compare them systematically and set priorities on rational basis.
Conceptual thinking	Understanding a situation or problem by putting the pieces together – seeing the big picture. (Cheng, et al., 2005, p. 37) Therefore, it is crucial that the manager sees the patterns and connections between problems and makes plans how to avoid them in the future.
Self-control	The ability to work under stress and to keep the emotions under control.
Flexibility	Refers to ability to adapt to the situation and turning it over in order to gain the most. Construction environment is rather dynamic and mistakes happen, meaning that a good Project Manager has to know how to come up with a new plan very fast in order not to waste time and money (see 5.1 Change management). It also refers to adapting to working with different people with various standards and demands. (Cheng, et al., 2005)

To sum up, even though the first study relates to several industries the analysis of the second article confirms the validity of those findings to the construction industry case. Each study comes up with two models for successful PM, one relating to their personality profile and set of skills, another one to activities that have to be performed during the project execution. Since the second study is strictly related to the Building Sector the activity list from this article is more valid for this report, however most of the points correlate with the list presented in the first study. Therefore, it can be concluded that regardless to the complexity of construction projects, the tasks performed by the Project Manager during execution of any type of project are quite a universal list. The main difference is that potential mistakes in construction enterprises have higher risks and can lead to greater losses than projects from any other industry.

Both articles emphasize the necessity of the PM to have a personal and customized approach to team members and to the project itself. However, the second study (which is strictly related to the building industry) indicates that the construction environment is characterized by rapid changes in personnel, therefore having a personal attitude is a great challenge for a PM. For that reason, the second study puts less on an importance on the personal attitude but on the logical approach and motivation skills of the PM.

It can be observed that both studies come up with very similar behavioral competences for the Project Manager, however the second case shows the importance of particular skills. The authors of this report believe that in case the method from the first study was applied to the second one, namely the direct interviews of PM, flexibility in decision-making would not be on the last position on the list. It is concluded from the statement of Casper Bach Munkholm (see Appendix A Interview with Casper Bach Munkholm by mail), who said in the interview that his daily work consists of overcoming bigger or smaller challenges, which come from the fact that activities do not always go as planned over the project duration. Therefore, authors believe that the ability to adjust to constantly changing environment is one of the most important features of PM, especially when considering working under Turnkey agreement.

7.3.2. Performance of the Project Manager- Emotional Intelligence

The articles presented in former paragraphs show some general directions of who the good Project Manager is. It is indicated that the good PM in construction industry does not differ much from any other industries when aiming to achieving the success. Nonetheless, more recent experiments show that the construction projects have much more complex tasks than typical projects from different industries and the success can be measured in different ways. (Fisher, 2011; Turner & Zolin, 2012) Moreover, the parties included in such project would value the success upon different standards and factors. The complexity and size of construction project are two very important factors that have to be taken into consideration when setting the goals. The selection of the team as well as the Project Manager has to be done accordingly to the goals of the project in order to improve Project Performance (PP). (Lianying Zhang Weijie Fan, 2013)

The right selection of the Project Manager for a certain project is proven crucial for the project performance. However, this task is usually not easy to perform. For this reason, over last decade there was a number of studies performed regarding Emotional Intelligence (EI) approach, which is supposed to help in predicting project outcomes. Those studies prove that Project Managers with highly developed EI are more likely to ensure better project performance of complex, international construction projects. If considering simple, domestic projects intelligent Project Managers with great technical knowledge are also able to achieve success, even with low EI level. (Lianying Zhang Weijie Fan, 2013) Furthermore, the conventional PM must adapt and be prepared for new technologies and trends so he/she has to be able turn into a project entrepreneur having the essential ability to play the role of a coach, being able to collaborate in a perfect manner with the other parties involved. A successful PM must be a good player of the general management roles, *"from the affirmation of a strategic vision and a meaning to a project, to the detailed control of key activities."* (Schaan & Navarre, 1987, p. 244)

Emotional Intelligence Concept

The concept was first introduced in 1990 by Peter Salovey and John D. Mayer. *In the article Emotional intelligence (1990),* they describe the EI as a separate concept only partly related to intelligence or social intelligence. For understanding purpose, they relate to Wechsler's intelligence definition "*the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment*". Social intelligence is presented as "*the ability to understand and manage people*". (Salovey & Mayer, 1990)

Emotional Intelligence, due to the article, is a division of social intelligence referring to certain abilities, such as monitoring feelings and emotions (self and other's) and to use them in order to manipulate else's thinking and actions. It is used in order to solve problems by recognition of emotional states of others and thereby, regulating their behaviours. People with high levels of EI use certain mechanisms automatically, which leads them to achieve expected results in teamwork. The diagram below presents the aspects that influence EI.

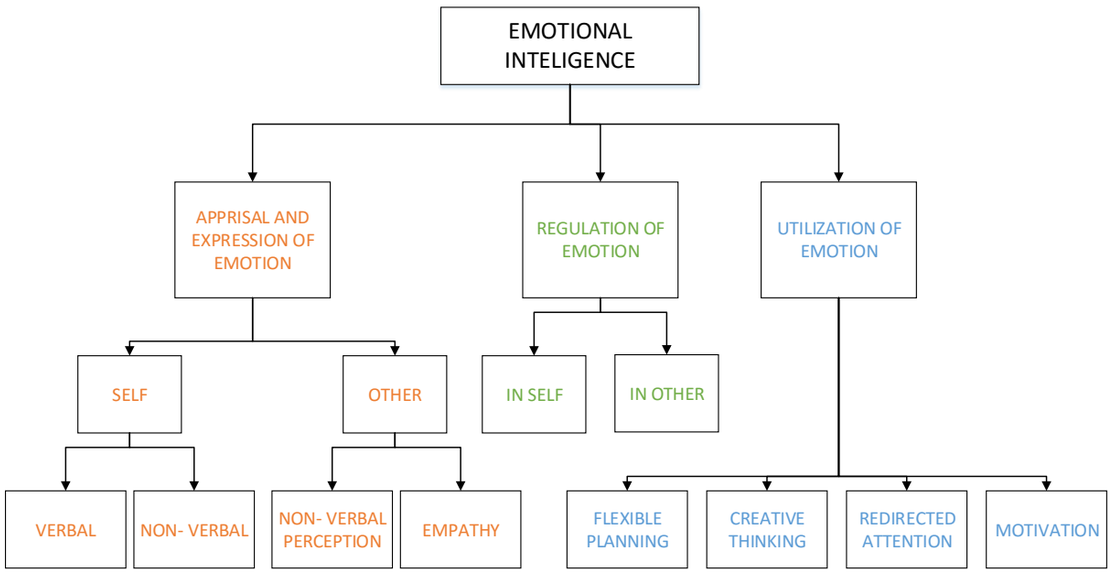

Fig. 7.3.2-1: Conceptualization of emotional intelligence (Salovey & Mayer, 1990)

The first part of the diagram (orange) in Fig. 7.3.2-1 refers to accuracy of emotion expression People with high EI are able to clearly indicate and express their state of mind verbally or non-verbally (body language for instance), as well as respond to them quickly and efficiently. Such individuals are also able to recognise emotions of the others, which makes them better in communication, which is known to be a very important factor from previously analysed articles. Such skill can be recognised by ability of active listening (non- verbal perception) or empathy. "*Empathy may be a central characteristic of emotionally intelligent behaviour*" (Salovey & Mayer, 1990), because this behaviour leads to being read as a genuine person, creating a real connection between people.

The green part of the diagram relates to regulation of emotions. The person with high level of emotional intelligence is able to not only control the emotions of themselves but also the others and channel those in a particular way so that they achieve planned results/ goals. Such quality also creates a possibility of manipulating others in a constructive and motivational way (analogy to influencing the team and leadership from previously mentioned articles), however there is a risk that it can be set antisocially, creating discomfort between team members, in case such skill is used with wrong intentions. (Salovey & Mayer, 1990)

The blue part of the diagram relates to the ways of channelling the emotions. "*Moods and emotions subtly but systematically influence some of the components and strategies involved in problem solving.*" (Salovey & Mayer, 1990). That means that the emotions tend to be a trigger for certain processes to go either wrong or right, and those have a big influence on the output of the action. Individuals with high emotional intelligence level recognise emotions and moods of the others and utilizes them in a specific, goal oriented way.

Furthermore, form the utilization of emotion can be enumerated four principles for emotion utilisation. The first one relates to *flexible planning*, meaning recognition of mood swings in regards to scheduling activities, which again can be related to important features of PM, namely analytical thinking. The research reveals that the group of people in a positive state of mind sees the fortunate events more likely to happen than the unfortunate one. The opposite happens with individuals in bad mood. It means, that emotionally intelligent individuals recognise the mood swings and analyse the situation from different angles, thereby their point

of view is broader and they are better prepared to choose possible opportunities possibly reducing time of activities on site. The second principal is *creative thinking*, which, in simple words, is categorizing features of the situation and channelling useful ones into problem solving. Mood swings have their role in this principal too; happy individuals tend to be more creative and productive. Mood redirected attention stands for prioritizing problems. For example, emotional intelligent individual is able to focus on ongoing activities even if undergoing through strong emotional stress privately, allocating attention according to present priorities. Lastly, *motivating emotions* relates to controlling moods and channelling them into motivating power. *Individuals with positive attitudes toward life construct interpersonal experiences that lead to better outcomes and greater rewards for themselves and others.* (Salovey & Mayer, 1990)

To sum up, emotional intelligence is a complex concept used to describe people, who are great at recognising emotions and using them in their own favour. Such individuals are more likely to see opportunities than problems. The interpretation and manipulation of moods comes to those people naturally and if they use their skills in a right manner, they tend to be seen as warm, trustworthy ones, which helps in problem solving.

Emotional intelligence (EI) as an attribute of a good Project Manager

When reading the previous paragraph of the report it seems clear that emotional intelligence is something to seek for in potential Project Managers in building industry. There was a number of different studies conducted regarding the influence of Project Manager's EI in variety of industries. Even though categories and project differ one from another in a huge scale the results are unambiguous in stating that PM's EI influences positively project performance. In 2001 Spencer proceeded with the study related to the impact of emotional competences on work performance of 28 construction and engineering Project Manager's, which proved that building industry is no different and it is highly valuable for PMs to have a greatly developed EI. (Lianying Zhang Weijie Fan, 2013)

The statement that emotional intelligence is important for Project Managers in building industry does not have a real meaning unless it provides the means of how such feature can be used in order to improve project performance. Müller and Turner in their article state a list of competences of PM that have a great role in improving the overall project process. Those skills were divided into three categories: *intellectual* (referring to technical knowledge), *managerial* (referring to knowledge related to project and people management) and emotional. The competences that belong to the last group relate to emotional intelligence and those are: *Self-awareness, Emotional resilience, Motivation, Sensitivity,* Influence, Intuitiveness, Conscientiousness (Müller & Turner, 2005, p. 55) (ANNEX 07.)

The list mentioned above can be easily connected to studies presented previously, meaning that some authors, even though not mentioning emotional intelligence as a concept, referred to those competences before the concept was introduced to the Building Industry, as the ones that make a great Project Manager. Nonetheless, the study upon EI also reveals that those features are not enough. The study shows, in parallel to the ones presented before, that the cultural understanding is one of the most important aspects of teamwork that the manager has

to take care of. Moreover, it emphasizes multiple times the importance of channelling the EI in order to create effective leadership, teamwork and empathy. (Lianying Zhang Weijie Fan, 2013)

As mentioned before, a part of emotional intelligence is empathy, which is the most important skill in creating cultural awareness that is crucial when working with international teams. Danish Building Industry does not perform a lot of multinational work nowadays, however, all over the world those situations happen more and more often. Nonetheless, in such condition, great communication and understanding skills are vital, meaning that the Project Manager without a high level of EI is most likely not to perform well due to limited skills in the area. (Lianying Zhang Weijie Fan, 2013)

All the theory presented above relates to improvement of the project performance, leading to success. In reality, the success of the project is seen differently from diverse perspectives. Definition differs due to variety of sizes of projects, teams and stakeholders involved or strategies of the companies. Moreover, the consideration of international involvement and contract type prior the works starts makes a great difference in project performance. Those two factors should be crucial in Project Manager selection for a certain work. Study shows (Lianying Zhang Weijie Fan, 2013) that emotional intelligence of PM influences their approach to those factors, meaning that the careful consideration is more likely to bring better results.

"*The challenge for the Project Manager is not simply to come to grips with the nuances embedded in different mentalities, but, more importantly, to gather and integrate the energy of individuals whose capabilities, productivity norms or criteria of good management can vary significantly according to their cultural background."* (Schaan & Navarre, 1987, p. 241)

The study also shows that the appreciation of the contract type in regards to the selection of Project Manager makes a difference in Project Performance (PP). As commonly known, there is a number of arrangements that can be used in building industry (see Chapter 4 PROJECT TYPES), and those are usually adjusted to the type of the project. The report reveals that the more complex the arrangement is, the more parties included, the biggest necessity for the emotionally intelligent Project Manager. A part of the report sums it up as:

To make efficient use of human resource in organizations, PMs with high cultural understanding and adaptability are supposed to be sent to international projects; meanwhile domestic projects would better to be undertaken by PMs with good organizational awareness. Then with respect to contract types, PMs with high inspirational leadership would better be allocated to the projects of unit price contract; while cost plus projects need PMs with high level of empathy to achieve better PP.

Since international projects are strongly affected by the abilities of cultural understanding and adaptability, PMs undertaking international projects would better attach more importance to improving cultural understanding and adaptability, and domestic PMs should attempt to enhance organizational awareness. Similarly, PMs of unit price projects may try to perfect inspirational leadership, while the ability of empathy in cost plus projects instead. (Lianying Zhang Weijie Fan, 2013, p. 205)

In conclusion, the concept of EI has been known and investigated for years however, associating it with the work of Project Manager is a rather new approach. Considering the fact that nowadays PM is required to be able to act as an entrepreneur, as discussed in chapter related to reformation of the industry, Emotional Intelligence skills became very valid features.

EI skills have a lot in common with management and/or leadership style and previously mentioned personal approach to team members. The main conclusion that can be drawn from the concept is that PM with highly advanced EI skills creates better connections with people, therefore, personal approach comes naturally. Moreover, those skills help in cooperation with subcontractors and suppliers by creating more friendly environment to negotiations.

Moreover, there is a great difference between execution of Main Contract projects to Turnkey ones management- wise. Due to the fact that in Turnkey Contract agreements the collaboration with subcontractors and suppliers is entirely up to PM and he/she has greater responsibility than under Main Contract, skills connected with EI are definitely desired in TKC.

The behavior models presented in previous subchapter combined with EI skills applicable for Project Managers create a great theoretical base for the way Project Manager should act, however it cannot be forgotten that working in this industry is associated with a great pressure and responsibility. Therefore, the expression of anger in case activities do not follow the plan is a rather usual event. The next subchapter gives an overview on the problem by presented a study with a surprising conclusion.

7.3.3. Anger as a positive emotion in project management

A great number of literature sources regarding leadership indicates that the positive attitude of the leader tends to transform into positive outcomes and negative leader's emotions channel into negative outcomes. (Lindebaum & Fielden, 2011) This statement confirms that the transformational leadership style brings up the best in team members, bringing the best results in project process. However, it is important that the PM remains being the manager, meaning that in certain situations transactional methods of management have to be used in order to execute desired goals.

The construction industry is extremely difficult one to work in, because it is associated with very high pressure, connected with tight deadlines, threat of giant financial losses and high competitiveness on the market. For this reason, it is extremely difficult to maintain an exemplar figure to follow when being a PM, especially if the project does not go the planned way.

"The management style of many in contracting companies is based upon the street fighting man. Banter and joking, usually at the expense of others, is used for point scoring when things are on reasonably even keel. If that fails or the pressure is great, verbal abuse and shouting are the weapons to instil fear and maintain the power I the office corridor" (Smyth, 2010, pp. 12-13)

The quote reveals that the emotion of anger is vividly present during execution of construction projects. Due to the constant pressure it is quite impossible to avoid it. The construction industry has a fame of being the most anger-expressive one and it is influenced by the fact that it is dominated by men, who are more likely to solve problem fasly and violently than women. In the interview with Lars Ørvad Nielsen (see Appendix B Interview with Lars Ørvad Nielsen by

mail), he emphasized that keeping a good tone on site is a very important part of PM's daily work, which drawn authors' of this report attention to the issue of anger and whether it's expression is a threat to the project success.

The study done by Dirk Lindebaum and Sandra Fielden reveal that anger, when applied in leadership in constructive way, tends to have a positive impact on the process. Their study was based on interviews with Project Managers from various companies, with different experiences. The study showed that they all claim that it is important to manage the anger as much as possible; however, the complete lack of expressing it might lead into not being taken seriously by team members. Their experiences also show that angry negotiators are better negotiators- meaning that when the competing party senses this emotion they are more likely to back down. Thus, the expression of this emotion, in particular, justified situations should not be seen as a role- violating behaviour, but the obligatory part of PM's leadership skills, a *"vital ingredient in decisive and defining moment of project, especially when it is directed towards parties with lower power."* (Lindebaum & Fielden, 2011, p. 452)

To sum up, the construction environment is very challenging for the PM in regards to keeping emotions in. The responsibility on their shoulders connected with health and safety of co-workers, together with a danger of financial losses due to project delays make it very hard not to react violently to potential mistakes. Therefore, the phenomenon of anger is nothing that can be avoided. However, the study about the topic presented before can be connected to conclusions drawn from Emotional Intelligence chapter. For instance, if the expression of emotion is done in accurate way, the anger can be channelled towards getting an advantage in negotiations or gaining respect among team members. However, when expressing it too often the emotion can create the hostile environment to work in for the rest of the team. Therefore, again the balance is the key. Project Managers should try to keep their negative emotions away from co-workers as much as possible in order to maintain the good working atmosphere, however, in case of the serious danger or mistake the Project Manager is allowed or even advised to act out accordingly within the range of decency. (Lindebaum & Fielden, 2011)

As mentioned previously a few times in this report, being honest and real creates the trust, therefore, following this way of thinking, hiding strong emotions such as anger shows rather fake attitude, making the PM less trustworthy. However, showing all the emotions by Project Managers is not the way to create trust between parties either. The complexity and importance of the trust issue for construction projects is the reason why the next chapter discusses the topic.

7.3.4. Trust as an important part of the construction project

It is believed that Danish society in general is one of the most trustful one not only in Europe but also all over the world. This does not apply to the construction sector though, which is said to be very mistrusting environment. (Wandahl, et al., 2011) It happens because the nature of the industry is very complex and there is a number of parties working on one project simultaneously, when each of them tries to make a profit in the end. The parties are usually dependent on each other's work, meaning that a mistake of one of the parties involved can lead to financial losses of another. Obviously, this kind of environment is not trust- friendly. However, there is a number of studies performed proving, that mutual trust has a great impact

on successful project performance. Therefore, in this chapter the importance of the issue is further elaborated on together with simple indications of what helps in creating mutual trust.

As previously stated, in case trust is established between project parties it brings a lot of value to the whole enterprise. Studies show that *"project actors are also less likely to withhold information deliberately and act against the interest of the overall project when relationships are trust driven, hence resulting in open and reliable flow of information."* (Manu, et al., 2015, p. 1495) Therefore, *"trust is important because it reduces the costs of control, optimizes the process ad generally creates a more effective workflow."* (Wandahl, et al., 2011, p. 1136)

Fig. 7.3.4-1 shows the correlation between the degree of established, mutual trust and the general efficiency of cooperation between parties, which affects quality of the project and reduces costs of the enterprise in the end. *"By increasing the general trust in a community with 10% it has been shown to give a financial growth of 0,5%."* (Wandahl, et al., 2011, p. 1136)

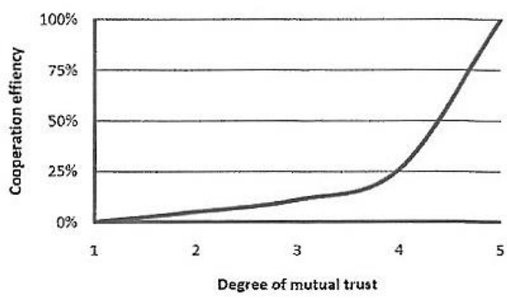

Fig. 7.3.4-1 Link between trust and cooperation efficiency

In order to verify the overall opinion of the importance of trust establishment within parties there was a study performed and presented in the paper *Trust as a Competitive Parameter in Construction Industry.* The study is based on the survey in which participants answer questions related to the topic. Participants are all kinds of construction project parties, including Project Managers, with different experience in the industry. The results of the study show that, for instance, most of the participants agree (66, 9%) or partly agree (27, 1%) that well established trust in project environment increases the value of the final product. Similar situation happens when participants answer whether trust increases earnings for all the parties involved (agree 40, 7%, party agree 41, 6%). (Wandahl, et al., 2011)

The importance of this issue was also brought up by Project Manager Lars Ørvad Nielsen from NCC, who states in the interview that the success of the cooperation with the customer relies on trust. (see Appendix B. Interview with Lars Ørvad Nielsen by mail) Project Manager has a great influence of creating the project environment. Taking into consideration previously mentioned advantages of trust, a good Project Manager should be able to ensure the clear communication between parties, leading to establishment of mutual understanding, therefore trust. For that reason, the concept is described below, together with influencing factors.

Trust in Building industry:

Overall, there can be enumerated three kinds of trust- *concrete, general and institutional* one. The type that applies to Building Industry is the general one, which is defined as trust between two parties who did not know each other before. There is a significant number of authors that attempt to define the aspect of trust. Their definitions refer to expectation of one person that the other one acts according to what was agreed upon or, at least according to what is morally right. The authors of paper *Trust as a Competitive Parameter in Construction Industry* analyzed previously mentioned definitions and came up with attempt for describing trust in building industry:

"An expectation of others in a collaboration not to take advantage of others to cheat, because the norms say so, and that the most value is achieved through a trustworthy cooperation." (Wandahl, et al., 2011, p. 1136)

In the construction environment, the procurement method of the project has a big impact on the trust issue. The Main Contract organization involves a number of parties who are likely to have different opinions, due to the fact that they do not have a common goal. Parties do work on one project for one client but each of them has separated interests, which is usually not the trust friendly environment. Moreover, client and architect or advisor usually have a lower awareness of value versus price, comparing to the contractor, which leads to disputes between parties, thus damaging trust. Nonetheless, nowadays the Main Contract is still the most common contract set up, even though it is the most troublesome one trust- wise.

In Turnkey Contract organisation, the number of parties collaborating with the client is reduced to minimum. In such case, Turnkey Contractor is obligated to perform in a way, so that he/she establishes trust between him/her and the client, which is easier than in previously mentioned case. Partnering (PPP) is characterized with the highest levels of trust, because parties have a common goal and have to rely on each other in order to achieve it. In general "*procurement and institutional frameworks that allow for greater information flows, focus on relationships rather than contractual or financial elements, promote longer-term relationships and reduce the level of uncertainty with regard to final payments; create higher levels of trust.*" (Wandahl, et al., 2011, p. 1498)

The aspect of trust is crucial internally, within the project team and externally, between project team and suppliers/ subcontractors. From the PM's perspective, the most important is the trust built with the client and the one concerning subcontractors/ suppliers. Establishment of trust from the client is Project Manager's job, however it is the contractor (in case of Main Contract) or Construction Manager (in case of Turnkey Contract), who takes care of relationships between him/her and subcontractors/ suppliers.

Benefits that come from trusting environment are very similar in both cases though, however supervision of communication between contractor and subcontractors is not within Project Manager's tasks in Turnkey arrangements, unless there is a serious conflict. (see Appendix B. Interview with Lars Ørvad Nielsen by mail)

PM should be familiar with influential factors of trustfulness and trustworthiness between contractor/ construction manager and suppliers/subcontractors, because in case of disputes, he/she should be able to recognize to root of the issue in order to find effective solution. Realisation of the nature of the dispute is crucial in rapid problem solving, because it gives an opportunity to find the source, so that it can be eliminated in order not to cause any more damage to the process. Those factors mainly relate to payments, health and safety conditions or insufficient workmanship. (Wandahl, et al., 2011)

The creation of trust is usually a long process, however construction projects are characterized with rather rapid change of working teams, meaning that natural trust building flow is not a case.

There is a number of attributes that can improve or, at least speed up the process of trust creation:

- *Open dialogs and exchange*
- *Mutual understanding for other people's needs*
- *Knowledge of others' values and conditions*
- *Unselfish efforts to achieve common goal* (Wandahl, et al., 2011, p. 1136)

One of the possibilities for the PM to enhance the communication and therefore trust between project parties is to use incentives in order to create a sense of common goal. Incentives should be made in a way, so that project parties are focused on elements that are important to the client but also work as an 'eye opener' for joining parties and 'win- win situation' for all. PM should also have in mind the so-called healthy competition, meaning grading particular teams for their trustworthiness. By doing so parties, being aware of each other's scores, compete for the higher grade, creating more open and communicative environment in the same time. The important thing is to select certain criteria for the grade, so that each party is graded in the same, equal and transparent way, similarly to the evaluation of tender procedure. It helps with avoiding the risk of other parties feeling mistreated or misjudged, simultaneously enhancing the competition. (Wandahl, et al., 2011)

The subchapter above proves that trust is the core of the relationships between the most influential project parties. There is no disadvantages of creating trust between parties, on contrary, it brings a lot of value to cooperation and even tends to bring profit money- wise. The most valuable type of trust between parties is created by long lasting, successful cooperation. However, due to rapid changes in crews working simultaneously on the project, the time for creating such relation is challenging.

Therefore, in the Building Industry the most common type of trust is based upon assumption that the other party is going to perform up to agreed standards, given up front. It happens due to the fact the PM cannot waste his time detail supervising each activity in order not to create delays. Nonetheless, even this kind of basic trust is created by clear, upfront statement of expectations and plans for execution of scheduled activities. For this reason, it is extremely important for the PM to have great communication skills which, since this is the base for trust creation.

7.3.5. Characteristics of a good Project Manager- Conclusion

The authors of this report find it necessary to conclude separately upon the features of a good project manager, in order to clarify the findings. The reason for that is that there is a necessity to clarify what features makes the PM good in his/her work.

As previously mentioned study indicate, there is a necessity for specific personal characteristics of a good PM, which have to be combined with certain activities. The list of tasks to be performed by PM on daily basis is connected both to specific activities related to project and to interaction with team members. The lists presented below are the conclusion from the analysed articles together with the interpretation of the interviews conducted with Project Managers by authors of this report, which can be found in Appendix A Interview with Casper Bach Munkholm by mail and Annex B Interview with Lars Ørvad Nielsen by mail.

The list connected to the work performance:

- To execute the project according to agreed specifications and deliver it to the client
- To communicate with project parties in an efficient manner
- To coordinate activities
- To recognize risk areas wand prepare a control plan
- To report the current status of the project to the Executive
- To create the schedule of tasks in careful and realistic manner, according to company quality standards, budget frames and resources availability,
- To ensure the quality and stakeholder's satisfaction,
- To ensure that the health and safety requirements are met,
- To be a chairman of meetings.

The list connected to human interaction:

- To make sure that team members are informed on their tasks,
- To set goals and spread them to the rest of the team,
- To encourage the communication between team members
- To coordinate and make sure of the cooperation between team members and involved parties
- To be a role model and promote and share knowledge
- To ensure good working environment

The tasks from the first list are rather technical and can be fulfilled by having the specific knowledge from the industry. The second list on the other hand is related to the leadership style and the human approach, which is where the concept of Emotional Intelligence applies. Even though the EI concept refers to manipulation of any emotion into gaining the goal it is still connected to list of behaviours that need to be applied in order for the intensions of PM to be received in a positive way by team members.

The list of behavioural features:

- Personal approach
- Trustfulness
- Being goal- oriented
- Flexibility and adaptability
- Proactivity in actions
- Being thorough in all activities
- Being a team- player yet a team leader in the same time
- Self- control

All those points from above are described in detail in the chapter, therefore there is no reason for further elaboration in conclusion. However, the authors of this research create the new order of those features based on the literature used for creating this dissertation and interviews conducted. Personal approach and trustfulness are at the very beginning of the list because those features were the most emphasized in most of the sources. Authors place the self-control in the last place due to the findings presented in the report previously, which suggest that anger expression can be used for creating respect and as a negotiation technique.

The interviews conducted for the purpose of this report were focused on Turnkey Contract organisation. Since the work of PM under such contract is more complex and it demands a bit more than stated before. Due to the interviews the most important factors for being a good TKC are:

- Skills and knowledge in partners selection, meaning having a good overview on possibilities available on the market,
- Due to the fact that he is the only link between the Client and the rest of the team, TKC must gain the trust of the client and perform in a way so this trust maintains intact,
- Being able to get into the 'client's shoes', therefore being good at reading people, their needs and possible intentions,
- Must be able to identify customer's decision patterns and act accordingly,
- Overview in law principle which apply when entering into contracts with subcontractors/ suppliers,
- Being able to prepare the financing plan for each stage of the project,
- Must be aware of different solutions possibilities and price ranges of those,
- Must be extremely systematic in work coordination,
- Should be able to think a few steps ahead and be prepared for the worst-case scenario.

The authors believe that TKC should have highly developed Emotional Intelligence skills and the list above proofs the statement. Most of the tasks listed cannot be performed without the skill of reading people. Moreover, turnkey projects tend to be more complex in execution, therefore the strategic planning combined with channeling emotions of team members into specific gaining specific goals seems to be a great advantage.

The study presented above answer the question who the good project manager is, the next question is whether the good manager of the project is a guarantee of the project success and what the phase 'project success' actually stands for. The answer to those questions can be found in the following subchapter.

7.4. Project success versus project effectiveness

In this report the phase 'successful project implementation' or 'successful Project Manager' are used a number of times, however the concept of the success of the project was not explained. For this reason, this chapter provides the reader with the information on how to understand the success of the project and common ways of evaluation of it.

Another aspect that has a significance to the project execution in an ideal manner is the impact of the Project Manager's work and skills regarding either the effectiveness or success of delivering a project from both internal and external views of the parties involved. The chapter also proves that there is a difference between project success and project effectiveness. Those phases are typically used by synonyms, and the confusion is understandable due to the similarities between them. Nonetheless, concepts are presented below together with indicators on how to measure each.

The last part of the chapter discusses whether the leadership skills of PM should be considered a significant factor to project success. There is presented the discussion between information theoretical sources and studies performed on the topic.

7.4.1. Project evaluation

In general, the simplest definition of the process success is meeting objectives previously set by the client. However, from the managerial point of view the topic is a little bit more complex, because the fact that the finished product is delivered does not mean that execution itself met the objectives. Therefore, the tools for project evaluation are elaborated on below. The most

well known criterion for measuring the success of projects is Iron Triangle[11] presented in Fig. 7.4.1-1, which is formed by analysing the relation between quality, cost and time of the project.

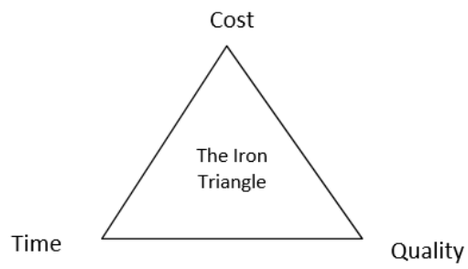

Fig. 7.4.1-1 the Iron Triangle (Atkinson, 1999)

By having good relation between the three aspects, it creates a feasible path for the project accomplishment, yet focusing only on the end product, not the process. Such evaluation method is used by the company TL BYG for Turnkey Project, which was revealed to authors in the interview conducted with Casper Bach Munkholm (see A Interview with Casper Bach Munkholm by mail). The results of the survey conducted for the paper *Trust as a Competitive Parameter in Construction Industry* reveal that 74% if the responders believe that the client's main emphasis is on the final result, rather than the process of achieving it. (Wandahl, et al., 2011) Client's wishes are the most important because those set project goal. The Iron Triangle represents three aspects of the project: Cost, Time and Quality. If the project is focused on the Cost aspect it means that it is executed at the lowest price, if the client focuses on time, the duration is the shortest. In case the client wants the highest quality available, the project is executed with the best materials/ techniques available. Logically, it is impossible to focus on all three aspect, because, for instance, the best quality available cannot be achieved when the focus is on reducing cost by all means. As follows, client wishes have to be balanced within Iron Triangle and specified in detail so that the goal is clear to the execution team. Project Manager is obligated to perform in a way so the team achieves the goal set by the client, however, evet though the client is rather indifferent to the team's process, the manager has to make sure that the team is as effective as possible. (Atkinson, 1999) Thus, there is no clear guidance of how the Iron Triangle can be achieved and projects still fail in some of the aspects. This means that using the triangle is an incomplete set of conditions and for a successful project implementation, it is far from enough. Delivering the finished product to the client states that the project fits within previously set frame, but it does not mean that it is performed in an optimal way. That mean that there is many ways to reach desired destination, being able to deliver the end product on time is always a success, however if management fails during the process it is sure to be well known within the industry, bringing bad fame which reduces the probability of getting another projects in the future. Therefore, keeping track on procedures held during the duration of the project execution and the cooperation of involved parties is crucial.

Dvir et al (2003) state that "*there are many cases where projects are executed as planned, on time, on budget and achieve the planned performance goals, but turn out to be complete failures because they failed to produce actual benefits to the customer or adequate revenue and profit for the performing organization*." (Dvir, et al., 2003) Therefore, the project success is strictly connected to project efficiency.

[11] Iron Triangle places Cost Time and Quality at the center of project success. However it has been suggested that whilst this triple constraint is important, it can also narrow the focus away from other crucial project success factors. (Jonas B. Ebbesen, 2013)

Shenhar et al (1997) note of the three traditional dimensions of project efficiency: time, budget and scope, scope has the largest role, as it also has an impact on the customer and their satisfaction. They note, *"Similarly, Project Managers must be mindful to the business aspects of their company. They can no longer avoid looking at the big picture and just concentrate on getting the job done. They must understand the business environment and view their project as part of the company's struggle for competitive advantage, revenues, and profit."* (Shenhar & Dvir, 2007)

According to the paper *The Relationship between Project Success and Project Efficiency, (2014*) there have been evaluated more opinions, which lead to the conclusion that project efficiency is important to the project success, however the efficiency itself does not mean the success. This means that concentrating on conditions as time, budget and scope they is not sufficient anymore, because the Project Manager plays an essential role as well by contributing to the business objective. Moreover, in relation to Fig. 7.4.1-2 there are presented the five dimensions of the project success after Shenhar and Dvir (2007):

Success dimension	*Measures*	*Time*
1. Project efficiency	Meeting schedule goal Meeting budget goal	End of project
2. Team satisfaction	Team morale Skill development Team member growth Team member retention	End of project
3. Impact on the customer	Meeting functional performance Meeting technical specifications Fulfilling customer needs Solving a customer's problem The customer is using the product Customer satisfaction	Months following project
4. Business success	Commercial success Creating a large market share	Years following project
5. Preparing for the future	Creating a new market Creating a new product line Developing a new technology	Years following project

Fig. 7.4.1-2: Five dimensions of the project success after Shenhar and Dvir (2007) (Serradora & Turnerb, 2014, p. 76)

In Fig. 7.4.1-2 are stated the success dimension, measures and time for each of the factors and by interpreting all of them there can be highlighted the aspect that the overall project success is more complex and wide concept than performing work according to Iron Triangle of project efficiency. (Atkinson, 1999)

Project efficiency *– meeting cost, time and scope goals*
Project success *– meeting wider business and enterprise goals*

According to the work of Turner and Zolin (2012) which is presented in the article *The Relationship between Project Success and Project Efficiency (2014)*, it is stated that there must be some extra conditions for the Project Manager to be able to complete a project within the necessary time and budget. These control parameters should be decided by the management of the company as a part of the planning and control process, in order to distinguish success over the long run of the projects. Moreover, these findings also prove that experts cannot overlook project efficiency goals if they want to take full advantage of overall success.

The success measuring criteria are applied to certain procedures held during the project procedure, which helps in overall evaluation in the end. Successful execution of procedures is up to many different factors, which should be considered when creating the process plan;

however, it happens very often that project activities fail. Thus, it is important for the evaluation of the project to categorise errors, for the purpose of future improvements. Due to Atkinson, errors can be split in two types:

- *Type I errors referring to the fact that something is performed in a wrong and ineffective manner such as, poor planning, inaccurate estimating, and lack of control.*
- *Type II errors, which can contain important aspects that are forgotten or not done as well as they could be, such as using incomplete criteria for success.* (Atkinson, 1999, p. 340)

Type I errors can be overcame by using more strict criteria for controlling and monitoring the progression, either by hiring more qualified employees or by using software that keeps track of the process. By having more skilled people, the likelihood of miscalculations happening is lower and the project cannot get off the track easily.

Type II errors are tricky or impossible to be found because when the source of the problem is unknown it is extremely difficult to find a good solution. The focus on the triangle formed by time, cost and quality can be included under this category of error because these success criteria are incomplete, which means that more aspects must be considered in order to have a successful implementation of the project by taking into account the parties that have a stake in it. It is important to consider all the project members and relationships between them for a better understanding of the characteristics that are vital for a good project. For this to happen, the Iron Triangle is then transformed into the Square Route diagram further presented in Fig. 7.4.1-3.

According to the article *Project management: cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria (1999)*, there are many authors (Turner, Morris and Hough, Wateridge, deWit, McCoy, Pinto and Slevin, Saarinen and Ballantine) which first enhanced the idea of the Iron Triangle criteria (see Fig. 7.4.1-1) for measuring success of projects. In time, they decided that it needs more precision, focusing on the other attributes, which should be taken into account when measuring the success of the project implementation. They all refer to the Square route diagram, which can be divided into three new categories, which refer to *technical strength of the information system, the benefits for the organisation (direct benefits) and the benefits for the stakeholder (indirect benefits)*. (Atkinson, 1999) The NCC company has their own system of evaluation of project with can be referred to the Square Route tool. Lars Ørvad Nielsen says that after the project is delivered they pay attention to aspects such as:

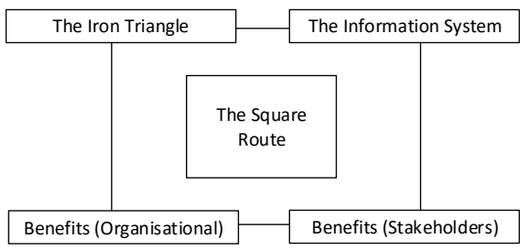

Fig. 7.4.1-3: the Square Route diagram (Atkinson, 1999)

- *Good and bad experiences (5 each)*
- *Advisor's feedback*
- *Suppliers/ trade contractor's feedback*
- *Evaluation from project members*
- *Learning*. (see Appendix B Interview with Lars Ørvad Nielsen by mail)

By considering the benefits for both, the organisation and the external parties, the type II errors can be prevented by providing a more realistic and stable sign of success. Relationship and good communication skills are the most essential aspects in a construction project because in this manner all the parties are aware of each other's responsibilities, this decreasing the likelihood of unpredicted errors to happen.

According to the article, both types of errors exist in projects and the Iron Triangle indicator is still used sometimes, even if it is neither satisfactory nor sufficient. Construction project management is different from other types of management because it is not possible to create a general execution guide and the resource number is constrained. Thus, this is not an impediment in creating a good flow of the project or an excuse for the projects to fail, because it is all about having worthy expertise in good planning, monitoring and fulfilling tasks effectively. Using the Iron Triangle of project management, time, cost and quality as the criteria of success creates an unrealistic view of the success rate and in order to try to prevent it from happening, more importance should be allocated to the Square-Route, providing a more realistic and well-adjusted symptom of success. (Atkinson, 1999)

Muller and Turner performed the study in 2007 regarding the correlation between PM's leadership style and project success. (Müller & Turner, 2007) The author of *Improving performance of construction project*s article combined the statements from previously mentioned article with studies performed by Chan (2002) upon process success criteria. This research lists those factors as: *time, cost, health and safety, profitability and quality, technical performance, functionality, productivity, satisfaction, environmental sustainability* (Lianying Zhang Weijie Fan, 2013). The list is said to be particularly important for design/build projects, meaning it is valid especially for Turnkey Contracts.

The combination of research mentioned above resulted in a list of project performance criteria in construction projects that are indicators of a project success.

Project performance criteria for construction projects:

1. *Meeting project's overall performance*
    - *Time*
    - *Cost*
    - *Quality*
2. *Meeting owner's requirements*
3. *Meeting project's multiple goals*
    - *Health and safety and environment*
    - *Absence of conflicts*
    - *Risks management*
    - *Claim management*
4. *Stakeholders' satisfaction*
    - *Owner's satisfaction*
    - *Project team's satisfaction*
    - *End-user's satisfaction*
    - *Suppliers' satisfaction*
    - *Other stakeholders' satisfaction* (Lianying Zhang Weijie Fan, 2013, pp. 199-200)

The list presented above is essentially a more developed square route. The very first part refers to the Iron Triangle criteria, the second point can be cross-referenced with organizational benefits from Square Route, the point 3 to Information System and point 4 to Stakeholders Benefits. The guidelines under each point make it easier for the evaluation process.

Prabhakar (2008) notes *"There is also a general agreement that although schedule and budget performance alone are considered inadequate as measures of project success, they are still important components of the overall construct. Quality is intertwined with issues of technical performance, specifications, and achievement of functional objectives and it is achievement against these criteria that will be most subject to variation in perception by multiple project stakeholders."* (Prabhakar, 2008)

The overall goal is to execute the quality construction work in previously set time frame, without exceeding the assumed budget. The owner has a right to state his/her own standards regarding quality of the product or maintenance etc. that have to be met. Project's multiple goals can be interpreted as indicators of PM's success, because those are all related to his responsibilities. Stakeholder's satisfaction applies to all the parties included in the enterprise, yet keeping them happy is also one of the tasks of Project Manager, meaning that it can also be an indicator of his/her success.

Turner and Zolin (2012) suggest that *"at the end of the project you judge success by whether the scope is completed within the constraints of time and cost, and the project's output is delivered to specification, in the months following the project success is judged by whether the output performs as required and gives the desired benefit; and in the years following the project success is judged by whether the organization achieves higher order strategic objectives that improve organizational performance ".* (Turner & Zolin, 2012)

7.4.2. Leadership practices vs success of the project

The purpose of this chapter is to demonstrate if the Project Manager's leadership style is considered a success factor and how significant is the Project Manager's work for a project and a company's prosperity, highlighting the aspect that leadership competences should be appreciated more, being considered as a safe and beneficial asset for a project or a firm.

The article *The Project Manager's leadership style as a success factor on projects: a literature review (2005)* presents a survey initiated by The Project management Institute in order to observe if the Project Manager's leadership style is considered a success factor by the literature in this field. There is also stated the output from the general management literature which includes the optimal leadership style as a success factor for the organisations management.

Remarkably, the authors of this report observed that the literature about the success factors in projects does not include the Project Manager competences or leadership style as a success factor. The correctness of this statement is debated below in this chapter.

The survey made by The Project Management Institute opposes this aspect by stating that, the proper type of leadership can be considered as a good asset in a project by showing "*that an appropriate leadership style can lead to better performance."* (Müller & Turner, 2005) Moreover, the article *The Project Manager's leadership style as a success factor on projects: a*

literature review (2005) tries to find answers for the two main statements according to the project management literature:

"1. Whether the competence, including personality and leadership style, of the Project Manager is a success factor for projects; and

2. If different competence profiles are correct for different project types." (Müller & Turner, 2005, p. 49)

In the following lines, the discrepancy in the literature is analysed regarding the Project Managers' importance for the success accomplishment of a company. Obviously, the general management literature states that a manager's leadership style is essential for the welfare of the business, and numerous studies confirmed that. Thus, the literature on project success factors is discreet about the role of the Project Manager and the leadership competences. "*So what does the project management literature have to say about the leadership style of the Project Manager, and its contribution to the success of the project?"* (Müller & Turner, 2005) The answer for this question has been built by using opinions from different authors during the years (1980-2004) on how the competencies and knowledge of the Project Manager should fit or improve the leadership style.

Starting with the 1980s, there was an era of extreme research into project success factors and most of the authors created lists for those. The conclusion that could be drawn from interpreting those lists is that back then they believed that Project Managers have to be highly knowledgeable and technically qualified, which would insure the quality of project execution. Those lists did not include any indication that the training of managers could be crucial in their performance, which leads to suggestion that they can gain their competences when performing the job, without prior preparation as leaders. (Müller & Turner, 2005, p. 55)

Andersen, Grude, Haug, & Turner (1987) made a list where they identified project complications, representing the boundaries for the PM work, which increased the chance of failure for the projects, focusing on the fact that this profession is rather people oriented than technical. Although, they mentioned the Project Manager's importance, they suggest that the managerial skills of the manager are more important they his/her theoretical knowledge, so that they should be chosen for the project based on their organisational skills instead of the technical ones. (Andersen, et al., 1987) Furthermore, Pinto and Slevin (1988) listed 10 project success factors, as observed in Fig. 7.4.2-1. They also did not consider the Project Manager importance of a great value although they suggested that *"Project Managers are too modest to consider themselves as a success factor".* (Andersen, et al., 1987) *Belout and Gauvreau (2004)* doubted the previous statement due to its contradiction to human resource management literature reports, nonetheless their research lead to the same conclusion. (Müller & Turner, 2005)

Success Factor	Description
1. Project mission	Clearly defined goals and direction
2. Top management support	Resources, authority and power for implementation
3. Schedule and plans	Detailed specification for implementation
4. Client consultation	Communication with and consultation of all stakeholders
5. Personnel	Recruitment, selection and training of competent personnel
6. Technical skills	Ability of the required technology and expertise
7. Client acceptance	Selling of the final product to the end users
8. Monitoring and feedback	Timely and comprehensive control
9. Communication	Provision of timely data to key players
10. Troubleshooting	Ability to handle unexpected problems

Fig. 7.4.2-1: Success factors according to Pinto and Slevin (1988)

As it can be seen in Fig. 7.4.2-1 the Project Manager technical skills are considered as a success factor for the projects together with the communication practises, which are mainly PM's responsibility, but the leadership style is not taken into account. This can mean that either the role of Project Manager does not have impact on the overall project success because the leadership is a big part of this profession and it seems not to be relevant, or an organisation success does not depend on the PM leadership skills. However, there is a dilemma because the literature about the leadership, HR management and organisations management are supporting the relevance of the Project Manager competences. According to the article, in order to highlight this aspect, "*many of the previously cited authors asked Project Managers their opinion, and it would seem that many Project Managers do not recognize themselves, their leadership style, or their competence as a contributor to project success.*" (Müller & Turner, 2005, p. 55)

On the contrary, according to the project management literature on the Project Manager's leadership style, the authors suggest that even if the PM's competence, personality, or leadership style is a controversial element, there are still some affirmations that remain safe to state:

"1. The Project Manager's competence is related to his or her success as a Project Manager
2. Different project leadership styles are appropriate at each stage of the project life cycle
3. Specific leadership styles are appropriate for multi-cultural projects
4. Project Managers have a leadership role in creating an effective working environment for the project team
5. Project Managers prefer task-oriented to people-oriented leadership styles
6. The Project Manager's leadership style influences his or her perception of success in different situations." (Müller & Turner, 2005, p. 59)

As it can be noticed from, the above two paragraphs, different literature sources suggests diverse principal features that contribute to the prosperity of an organisations. Therefore, the question mentioned before, "So *what does the project management literature have to say about the leadership style of the Project Manager, and its contribution to the success of the project?"* can be answered in two ways depending on which literature is chosen. The conclusion based on the article is that:

"The literature on project success factors has largely ignored the impact of the Project Manager, and his or her leadership style and competence, on project success. This may be because most of the studies asked Project Managers their opinion and the respondents have not given due consideration to their own impact on project success. Or, it may be because the studies have not measured the impact of the Project Manager and, thus, not recorded it. Or, it may be because the Project Manager has no impact. However, that last conclusion is in direct contrast to the general management literature, which postulates that the leadership style and competence of the manager has a direct and measurable impact on the performance of the organization or business." (Müller & Turner, 2005, p. 59)

Regardless to the authors (introduced in the article) being appointed by the Project Management Institute to study whether the leadership style and competence of the Project Manager is a success factor on projects and whether different styles are appropriate on altered types of projects, none of the statements is objectively answered. For the first one, there is necessity for more information related to the reality happening in the organisations and it must be directly measured based on either qualitative or qualitative data. Due to the fact that the previous article did not respond to the second question, the authors of this report found another article*, Leadership competency profiles of successful Project Managers (2009),* which overall highlights both statements, but it demonstrates the true role and capabilities of the Project Manager for a project and for company.

The article *Leadership competency profiles of successful Project Managers (2009)* presents the leadership competency profiles for different types of projects using the Leadership Development Questionnaire (LDQ).[12]The data is collected from four hundred interviewees in order to prove the intellectual, managerial and emotional competences of the Project Managers. The projects were categorized based on their application type (engineering & construction, information & telecommunication technology, organizational change), complexity, importance and contract type.

"Managers are more likely to perform better or to stay longer in their position if their personal characteristics meet the requirements of the position (Mumford et al., 2000). A popular way to identify these characteristics is by profiling the personalities of successful managers." (Müller & Turner, 2010)

By reviewing the leadership theories during almost 80 years, it shows the distinctive combination of behavioral, temperamental, emotional and mental attributes of a leader, in order to grow a person's particular leadership style. The profiles are then used to relate the match between the existing profiles of the Project Managers and the aspects which make a project successful or not, regarding the success or failure of a person's leadership position. This leads to the following question in the research paper: *What leadership competency profiles are exhibited by the Project Managers of successful projects of different type?* (Müller & Turner, 2010)

Furthermore, the article presents the 15 dimensions of the Leadership Dimensions Questionnaire (LDQ), which can be found in ANNEX 06. The main purpose of the article

[12] Dulewicz & Higgs (2005), developed the Leadership Dimensions Questionnaire (LDQ) used to assess individualistic leadership styles (Müller & Turner, 2010)

Leadership competency profiles of successful Project Managers (2009) is to actually fit the dimensions with the project types, but the purpose in the context of this written report is to respond to the following statement: *If different competence profiles are correct for different project types.* (Müller & Turner, 2005) In order to understand the results of the article the following statements found in several journal articles regarding the subject in case have to be analysed.

"Traditionally project management is understood as using the right tools and techniques for being successful, regardless of a Project Manager's match of personality with project type" (PMI, 2004).
"Leadership, in project management, requires multiple techniques and the ability to adapt to any type of situation. In order to ensure that a project is executed properly, the project manager must effectively apply project management processes"(PMI, 2013).

As observed, there are many different opinions related the importance of the relationship between the leadership competences and project types, but none of them has a clear meaning of how this actually works. Nonetheless, the statements show a progress of the importance of the leadership competences, but surprisingly they are in contradiction with the chronological development of leadership theories which normally use the team roles test (refer to *Leadership competency profiles of successful Project Managers (2009)*) like Myers-Briggs (Briggs-Myers, 1987), or Belbin (1986), etc. as measures of leadership skills. However, these measures are not leadership measures in terms of Project Managers' leadership capabilities, meaning that there is the need for a more developed measure such as the Leadership Development Questionnaire (LDQ). (Müller & Turner, 2010)

Until now, all the aspects presented about the leadership profile showed that certain leadership aptitudes relate with success in leadership in general. Moreover, Müller and Turner (2007) identified the associations between success and Project Managers' leadership competences, using the LDQ and a composite measure of project success and the practical implications of the results are:

"(1) Leadership competencies should be considered when assigning Project Managers to projects.

(2)Project Manager training and development should focus not only on technical and management skills, but also on development of leadership competencies." (Müller & Turner, 2010)

In other words, the Project Managers have impact on the project performance, because there should exist a strong connection between the type of the project and the accurate leadership style. By being part of an organization, Project Managers gain experience and in time they are capable of improving their leadership competencies, predominantly developing the emotional dimensions and allowing them to be successful in any type of given projects.

Based on the article *Leadership competency profiles of successful Project Managers (2009),* future studies could build on and validate the current results, in order to assess the role of the organization implications, as well as the Project Manager's interaction with different teams and stakeholders in the projects. "*Developing the Project Managers' leadership styles leads to*

better project results and personal success of the individuals." (Müller & Turner, 2010) Goffee and Jones (2000) state that *effective leadership requires "being yourself, with skill".* (Goffee & Jones, 2000)

Conclusion to the chapter

In conclusion, there is a contradiction between what the literature says about an impact of leadership skills of PM to what performed study presents. Even though the main responsibility of PM is to execute the project within certain frames, his work is also connected with managing people who perform tasks. Therefore, the literature sources emphasise the importance of PM having at least basic leadership skills in order to ensure the efficient communication and create the good working environment. Following this thought, the PM creates the links between influential project parties in order to proceed with activities. In case PM fails in his/her task, the other parties cannot perform their work leading to possible delays and loses. Therefore, the authors of this paper agree with the statement that the leadership skills of the project manager have a great impact on project success, which is in contrary to the findings of the study analysed in this chapter. However, the authors believe that the method of the study was not optimal, because interviewed Project Managers were asked directly whether they find their leadership style as success factor. Answering this question with the 'yes' would seem very arrogant and this is against the human nature to show up from this side to interviewing stranger.

8. CONCLUSION

The target of the conclusion is to answer to the two main questions presented in the inception stage by focusing on the problem statement by the content of the study: '*What are differences between the organization of Main Contract and Turnkey Contract management- wise?*' and '*What makes a good project manager in Turnkey Contract?*'

In order to be able to respond to previously stated questions the background of Danish Building Industry must be analysed, in order to emphasize the reasons for the present situation in the construction industry. Execution principals of both private and public projects were incorporated, explaining that the percentage of the public project is lower than the private ones because they imply EU regulations, which are more complicated, compared to the Danish law. Further, the general project participants, project phases, several contractual agreements and agreed documents are presented, focusing on the diverse tender procedures because it depends if the public funding is included or not and different rules apply for DK and UE.

By combining data from several resources the differences between Main Contract and Turnkey contract are elaborated on in this work. The main variation from Main Contract is that in the Turnkey arrangement the contract covers the design and execution. Thereafter, the client signs the contract with only one party instead of two.

By describing the advantages and disadvantages of the two previously mentioned contract setups in combination with currently used contractual agreements in Denmark it is stated that in case of Main Contract agreement, the most optimal for the BO is to assign qualified people for both the design and execution parts, so the implementation is not disturbed. In connection to Turnkey Contract, the main condition set by the client in contractor selection should be verification of their work experience in similar projects, in order to be sure that good and qualified materials and resources are elected for the construction process and the. Additionally, the responsibilities of the Project Manager are described, depending on the type of agreement chosen. In Main Contract, it is typically the architect or the engineer who acts as the Project Manager for the construction of the specific design and therefore must collaborate with the parties involved in the project. Project Manager acts as a connexion between the building owner and contractor in the administration of the construction contract. In Turnkey Contract, the contractor appoints the Project Manager, who is responsible for building a good working collaboration with the members of the project and keeping the client informed of any changes.

The essential differences regarding Project Manager's responsibilities are connected to the fact that in a MC, the PM main role is to simply execute what is agreed upon the contract, trying to avoid delays. Considering the TKC, the PM is responsible for negotiations with the client, therefore he has to be aware of all the solutions available on the market, the quality of those and price, in order to satisfy client's wishes. In the same time, the TKC has to perform all the other tasks of the PM regarding the execution of scheduled tasks assuring the collaboration between parties and great working environment. For these reasons, the authors conclude that acting as a Project Manager in Turnkey Contract is more complex and challenging than acting under Main Contract, and choosing a TKC has more advantages than MC, when referring to

what is best for the BO (in case BO has no construction education or background), because the design and construction of the project can be commenced by signing only one contract.

In the second part of the report is emphasised the importance of PM having at least basic leadership skills in order to ensure the efficient communication and create the good working environment. He/she creates the links between influential project parties in order to proceed with activities. In case PM fails in his/her task, the other parties cannot perform their work leading to possible delays and loses. Therefore, the authors of this paper agree with the statement that the leadership skills of the project manager have a great impact on project success.

The main conclusion regarding the features of the Good Project Manager is presented in the set of lists. The first list refers to specific tasks that have to be performed and the authors divide those with activities related to technical knowledge and to the ones related to managing the team.

The list connected to the work performance:

- To execute the project according to agreed specifications and deliver it to the client
- To communicate with project parties in an efficient manner
- To coordinate activities
- To recognize risk areas wand prepare a control plan
- To report the current status of the project to the Executive
- To create the schedule of tasks in careful and realistic manner, according to company quality standards, budget frames and resources availability,
- To ensure the quality and stakeholder's satisfaction,
- To ensure that the health and safety requirements are met,
- To be a chairman of meetings.

The list connected to human interaction:

- To make sure that team members are informed on their tasks,
- To set goals and spread them to the rest of the team,
- To encourage the communication between team members
- To coordinate and make sure of the cooperation between team members and involved parties
- To be a role model and promote and share knowledge
- To ensure good working environment

The activities from previous lists have to be performed considering the behaviours from the list presented below

The list of behavioural features:

- Personal approach
- Trustfulness
- Being goal- oriented
- Flexibility and adaptability
- Proactivity in actions
- Being thorough in all activities
- Being a team- player yet a team leader in the same time
- Self- control

As previously stated, the work of the PM in Turnkey Contracts is more complex than in Main ones, therefore the requirements for their performance very. The authors create the list of

features that, in combination with previous lists, create an ideal Project Manager in Turnkey Contract.

- Must have skills and knowledge in partners selection, meaning having a good overview on possibilities available on the market,
- Due to the fact that he is the only link between the Client and the rest of the team, TKC must gain the trust of the client and perform in a way so this trust maintains intact,
- Should be able to get into the 'client's shoes', therefore being good at reading people, their needs and possible intentions,
- Must be able to identify customer's decision patterns and act accordingly,
- Must have an overview in law principle which apply when entering into contracts with subcontractors/ suppliers,
- Being able to prepare the financing plan for each stage of the project,
- Must be aware of different solutions possibilities and price ranges of those,
- Must be extremely systematic in work coordination,
- Should be able to think a few steps ahead and be prepared for the worst-case scenario.

After specifying, what characteristics make a good project manager the authors of this report clarify what is the success of the construction projects. From the Client point of view, the success is receiving the requested product on time. From the managerial point of view the success is understood by the flawless execution, without any internal or external conflicts, creating long lasting relationships between parties that can be used in the future enterprises. Companies tend to have their own ways to evaluate projects they work on. The easiest tool for project evaluation is an Iron Triangle which stand for finding the balance between time, cost and quality attributes. However, this tool does not provide with any feedback on collaboration within parties, therefore, there is another tool, called Square Route, which combines previously mentioned attributes with evaluation of subcontractors' satisfaction, information exchange and direct benefits to organization.

Last but not least, the report argues whether leadership skills of PM contribute to the previously explained project success. The authors studied the literature related to the topic and sources unanimously stand for the statement that PM's leadership skills contribute to project success, however there are studies presented in this report is conclude on the contrary. However, the authors believe that the method of the study was not optimal, because interviewed Project Managers were asked directly whether they find their leadership style as success factor.

9. FURTHER DISCUSSION

The further discussion upon the topic presented in this dissertation can be combined with limitations that authors faced during the creation process. The very first idea for the continuation of the study would be determining whether the conclusions drawn from gathered data would be validated by either interviews or surveys conducted with Project Managers from another companies with different experiences.

Moreover, the study would gain additional value in case the Change Management methods would be presented in the context of evaluation of Project Manager's work. Therefore, it would be necessary to present which good practices in CHM bring the most value to the project and how those should be performed by the Project Manager. It could reveal the new characteristics of PM that could be added to the list of features of a good Project Manager presented in this work.

In addition, strategies of companies tend to give the direction to PM's work in general, therefore the continuation of this study could be the analysis of typical behaviors of PM when each strategy is applied. The difference in work approach related to the strategy of the company revel practices that are less universal. Therefore, combining findings from this report with this kind of data would create a better overview on how the work of PM is performed and how it should be done in the ideal manner.

The other aspect that could be further elaborated on is the current law. It is argued that it is difficult for Project Managers to perform their job in the ideal manner due to a number of prohibitions. On the other hand, would the bigger freedom in, for instance, selecting subcontractors change common practices of PMs? What would be the most advantageous law correction for increasing project effectiveness by improving PM's work?

Last but not least, it is commonly know that there is an increase in BIM usage in the industry. For this reason, the analysis on how BIM influences PM's work on daily basis under different contract setups could bring additional requirements towards ideal Project Managers features.

List of figures

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APPENDIX

A. Interview with Casper Bach Munkholm by mail

Casper Bach Munkholm
Bygningskonstruktør
Email: cb@tlbyg.dk
Date: 23.11.2015

1. **Can you tell us about your experience as a Project Manager in the construction industry? (number of project, size and type)**

Jeg har været ansat hos TL Byg i ca. 3 år, og i den periode har jeg været involveret i flere projekter. Jeg har været med som byggeleder på bl.a. Musikkens Hus I Aalborg, samt et par andre mindre sager. Herudover har jeg haft hovedentrepriser i størrelsesordenen fra 1 til 20 mio. kr. ekskl. moms, og et par totalentrepriser på op til 30 mio. kr. ekskl. moms, hvor jeg har sidet/sider som projektlederen.

I have been with TL Byg for about 3 years, during which time I have been involved in several projects. I have been the construction manager, for House of Music in Aalborg, as well as a few other minor cases. In addition, I had Main Contracts in the range from 1 to 20 million. kr. excl. VAT and a few Turnkey Contracts of up to 30 million. kr. excl. VAT where I have worked as the Project Manager.

2. **What is the difference between acting as a Turnkey Contractor or a main one?**

Den største forskel er, at du skal stå til ansvar for hele projektet, og ikke kun byggeprocessen. Der er altså en væsentlig forskel på eksempelvis en hovenentreprise og en totalentreprise. Ved sidstnævnte er det vigtigt at have kenskab til rådgivere og bygherres forpligtelser.

The biggest difference is that you will be accountable for the entire project and not only the construction process. So there is a significant difference, for example between a main and a Turnkey Contract. The latter is important to have knowledge gained as consultant and regarding client's obligations.

3. **What are the responsibilities of the PM?**

Det kan variere meget imellem virksomhederne, men herunder et par punkter det kan være:

Sagsøkonomi (overordnet)

Tidsplaner

Kvalitetssikring

Kontrahering

Håndtering af div. faggrupper

Osv..

It can vary between companies, but including a few items it can be:

Case Economics (general)

Time schedule

Quality assurance

Contracting

Managing people

Etc ..

4. **What skills do you think a PM should have? Which one is the most important one in your opinion?**

Det må være vigtigt at kunne gennemskue et byggeforløb, for at kunne være på forkant. At have styr på grundlæggende regler vedr. aftaleforhold, samt økonomisk forståelse.

It may be important to able to manage a build process , to be prepared in advance. Having control of basic rules concerning contractual and financial understanding.

5. **What is your strategy when approaching a turnkey project?**

Ekstrem grundig gennemgang af projektet fra start, for at komme på forkant.

Extremely thorough review of the project from the start to be prepared in advance.

6. **How much freedom do you have in decision-making? From your experience, what was the biggest challenge you had?**

Hvor jeg er ansat, har jeg frihed til stort set alt. Jeg orientere mine overordnede om forholdene, og handler derefter.

Min hverdag bestå 90% af udfordringer der skal løses, nogen større end andre. Det er dog svært at vælge en ud, men noget som gentager sig, og som kan være svært at håndtere, er underentreprenører som ikke "lystre". En entreprenør som ikke bliver færdig til tiden, eller som ikke levere op til den kvalitet du selv kan stå inde for.

Where I work, I have the freedom to pretty much everything. I inform my superiors about the situation and act accordingly.

My daily life consists 90% of challenges to be solved, some larger than others. However, it is difficult to pick one out, but something that repeats itself, and that can be difficult to handle, are subcontractors who do not "obey". A contractor who does not finish on time or did not deliver up to the quality you can vouch for.

7. How do you evaluate projects process?

Vi har et internt møde hver måned, hvor vi gennemgår tidsplan, kvalitetssikring samt økonomiske forhold.

We have an internal meeting every month, where we review schedule, quality assurance and economic conditions.

8. How PM collaborates with the team members in turnkey projects?

Der samarbejdes på mange måder, men den vigtigste rolle her, er at sikre, at andre samarbejder.

There is cooperation in many ways, but the most important role here is to ensure that others are collaborating.

9. Does PM have a personal approach to his team members? Based on what does he/she choose the ideal members for the team?

Ja.

10. How is the collaboration with the client/ subcontractors in general? What would be ideal one?

Et meget bredt spørgsmål...

11. How involved is PM in conflict solving? Refer to casual conflicts regarding client wishes, design & execution mistakes, team work issues- site manager, subcontractors, client advisor

Det afhænger meget af virksomheden og af projektets størrelse. PM kan være eneste person på projektet, men kan også være det sammen med 100 andre eller flere, så arbejdsopgaven variere meget.

It very much depends on the company and the size of the project. PM may be the only person on the project, but can also be together with 100 other or more, so the task vary greatly.

B. Interview with Lars Ørvad Nielsen by mail

Lars Ørvad Nielsen
Senior Projektchef
Email: lnx@ncc.dk
Date: 24.11.2015

1. **Can you tell us about your experience as a Project Manager in the construction industry? (number of project, size and type)**

I have about 12 years of experience in the construction industry, where I started as a trainee and worked my way up to being Senior Project Manager responsible for major construction projects at NCC Construction

Thus, I have worked with responsibility for simple construction projects to now perform large complex building projects.

2. **What is the difference between acting as a Turnkey Contractor or a main one?**

Ordinary contract:

- Developer:
  - **Prepares tender documents for the construction project**
  - Obtain any governmental permits
  - Catch up deals on everything craft work from a single company.
    - Normally be the crafts business, which accounts for the bulk of the work, eg. The builder who enters as general contractor, and the other craftsmen, carpenter, painter, installers, etc. Then act like his subcontractors.
    - Main Contractors are responsible for the coordination and execution of work
- Architecture and engineering are established business and managed by developer.
  - Provide the finished drawing and description material
  - **Supervision of the work and any construction meetings (paid by the developer)**
- General contractor:

- Performs work based on the client's material, **drawn up by advisers to the client.**

Turnkey Contract:

- Developer:
  - Based on wishes prepares a Turnkey Contractor both outline proposals and later finished drawings and description for the construction.
  - **Advantage: agreement and settlement is done with only one company.**
  - The **developer has usually own advisor on the sidelines**, although this is an agreement with a contractor.
- "Turnkey"-contractor:
  - **Provides for requesting the building permit from the municipality.**
  - Coordinate all subcontractors and supplies during the construction.
  - **"Turnkey"-contract is often used for the rather large tasks.**

3. **What are the responsibilities of the PM?**

"Turnkey"-project:

- **Overall management of the project:**
  - Implementation of projects according to agreed project objectives.
  - Develop organizational plan
  - Ensure clear communication
- **General project management**
  - Be able to set clear goals, communicate them.
  - Organizing Project (meeting structure, information, correspondence, filing)
  - Reporting to the Executive by relevant deviations
  - Selecting partners (suppliers and subcontractors).
  - **Enter into contracts with trade contractors and suppliers according to purchasing goals.**
  - Determine appropriate follow up and delegate some of the work.
- **Economy**
  - Preparation of credible budget.
  - **Must be able to provide a full overview of the project's finances at all stages.**
  - Be able to ensure real and financial solutions, **including analyzing alternatives.**
  - Implementation of the management and reporting of the economy **with special focus on the opportunities / risks.**
- **Customer**
  - Must be able to identify the customer's needs and meet his expectations.

- Must be able to identify the customer's decision pattern and make timely decisions.
- Ensure that important events (contract, handover, etc.).
- Ensure handover with **the client and ensure a positive experience, proper legal procedure and obtain missing.**

- **Time**
  - Must develop, communicate and follow up on **realistic schedules. Ensuring start of the project to create an overview of the overall planning activities.**
  - **Implement actions necessary for compliance with agreed schedules.**
- **Quality**
  - Must help to influence project solutions to **be simple and proven**.
  - Must **uncover risk areas** and ensure follow-up and control.
  - Ensure that the **project is scrutinized at every stage and risk assessed**, and that on the basis of which focus on supervision and control of the areas of highest risk.
- **Jura**
  - Have **sound knowledge of the general contract law rules** that apply to the industry
- **Work - Safety**
  - Must **ensure a good working environment** for all employees on the project throughout the implementation of the construction project

4. **What skills do you think a PM should have? Which one is the most important one in your opinion?**

- Look at competencies under the responsibility of the Project Manager
- **Good business acumen**
- **Systematic and effective**
- **Motivated by a busy day at work**

5. **What is your strategy when approaching a turnkey project?**

Personal, my strategy is to **sit well with the project**, and b**e prepared for the "Worst Case" throughout the entire project**. At times, you as Project Manager trying to **put themselves in the client's place** - to assess his wishes to the project.

Likewise, I set myself **to be a role model for other project participants**, whether this might be external engineers and architects or NCC employee who refers to you as a Project Manager for the turnkey project

6. **How much freedom do you have in decision-making? From your experience, what was the biggest challenge you had?**

I **try to make decisions together with the other projectmembers**, but I have the **ultimate responsibility for the project and thus accountable to the management of NCC by monthly reporting.**

In a big company like NCC, there are some guidelines to follow, which should not be understood as a negative - but only to ensure the project does not go wrong.
The biggest challenges to projects that I feel will be **manpower treatment such as redundancies or emotional issues**

7. **How do you evaluate projects process?**

Once the projects are handed over, the whole project will be evaluated according to. the following:

- Good and bad experiences ("five good and five bad")
- Feedback, advisor
- Feedback, suppliers / trade contractors
- Evaluation of project members' role, etc.
- Learning

8. **How PM collaborates with the team members in turnkey projects?**

The Project Manager ensure continuous good cooperation with other team members by:

- Hold project meetings with other group members **- about every 14 days**
- Hold "one to one" - conversations with individual team members - **continuously through the construction period.**
- Keep the "**good tone**" on the construction site
- Going forward...

9. **How is the collaboration with the client/ subcontractors in general? What would be ideal one?**

Cooperation with the customer comes to **creating trust** ... The trust between the customer and the PM fosters a good working relationship. **This helps create common ideas and decisions throughout the construction phase.**

Cooperation with subcontractors will primarily take place between construction manager on the project and the subcontractor. I**n the event that conflicts or inconsistencies between the PM will**

have to step in. However, it is important for the Project Manager to create dialogue and trust between both parties

10. How involved is PM in conflict solving? Refer to casual conflicts regarding client wishes, design & execution mistakes, team work issues- site manager, subcontractors, client advisor

In case of conflict extent PM assess whether this requires involvement. Conflicts with the developer, architects, engineers or major economic conflicts will PM take care of. On special economic issues, the PM should contact the management in NCC surrounding solution

ANNEX

01.PER AARSLEEFF 2015

01.2 PER AARSLEEFF 2009-2014

02.1MT højgaard 2009 20013

02.2MT højgaard 2014

03.1NCC 2005 2014

03.2NCC_2015

04.A ENGGÅRD 2010 2014

05. Deloitte

06. The Project Manager's Leadership Style as a Success Factor on projects

07. EQ IG MQ info