



DEGREE PROJECT,  
CIVIL ENGINEERING AND THE BUILT ENVIRONMENT  
REAL ESTATE AND CONSTRUCTION MANAGEMENT  
MASTER OF SCIENCE, 30 CREDITS, SECOND LEVEL  
*STOCKHOLM, SWEDEN 2017*

# The safety manager as a boundary spanner between communities of practice

The employment of a safety manager in a Swedish construction company

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ROYAL INSTITUTE OF TECHNOLOGY

DEPARTMENT OF REAL ESTATE AND CONSTRUCTION MANAGEMENT

## Master of Science thesis

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Title	The safety manager as a boundary spanner between communities of practice – The employment of a safety manager in a Swedish construction company
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Department	Real Estate and Construction Management
Master Thesis number	TRITA-FOB-PrK-MASTER-2017:45
Archive number	503
Supervisor	Tina Karrbom Gustavsson, Dr. Tech., associate professor
Keywords	Safety management, safety manager, boundary spanning, communities of practice, human resource management

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### Abstract

Safety is an important concern within the construction industry. Many different management strategies exist in the literature, but despite ambitious efforts to improve the safety and prevent accidents, the accident incidence is still unacceptably high. This paper examines the employment of a safety manager in the Swedish construction industry as a strategy to foster a better safety culture, and discusses how the safety manager should approach the project based organisation (PBO).

The study uses an abductive approach with an iteration of interviews, observations and a literature study to gain deeper knowledge of the subject. The research comprises a cross sectional interview study of semi-structured interviews to narrate the role of the safety manager accompanied with a short survey. The study is limited to three projects of one Swedish construction company, and a new role not yet established in the company. Furthermore, the study uses a human resource management approach with focus on communities of practice and boundary spanning.

The findings report that the safety managers take on a role as a boundary spanning link between well-established but unsynchronized communities of practice. The identified communities are the HR department and the PBOs. Furthermore, the safety manager functions as a “double-sided” boundary spanner, to broke knowledge and support employees to achieve a satisfactory safety culture. However, the narratives express a present ambiguity and a need to clarify the role and its responsibilities regarding safety in the PBO.


The thesis contributes with insights of the safety manager’s practice and discusses how safety knowledge should be transferred between communities of practice in the fragmented PBO and its high level of tacit knowledge.

# Acknowledgement

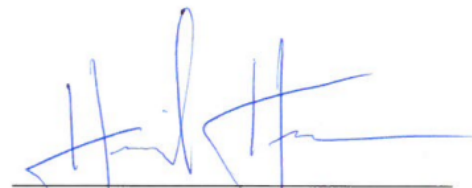
This master thesis is a degree project in architectural design and construction project management and is written on behalf of the Department of Real Estate and Construction Management and the school of Architecture and Built Environment at the Royal Institute of Technology, KTH. We would like to express our sincere gratitude to our supervisor Tina Karrbom Gustavsson, Dr. Tech., associate professor, for providing us with assistance, expertise and encouragement during the process of this dissertation.

The study was conducted in collaboration with the business unit Hus Stockholm Nord at Skanska Sverige AB, under supervision of Jessica Pondman Lagerström (work environment developer) and Louise Bävertoft Nyberg (business unit development manager). We would like to express our sincere gratitude for your encouragement and contribution throughout the process of this study and in the writing of this dissertation.

Stockholm. June 2017



Martin Desmond



Henrik Hansson

## Examensarbete

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Titel	The safety manager as a boundary spanner between communities of practice – The employment of a safety manager in a Swedish construction company
Författare	Martin Desmond och Henrik Hansson
Institution	Fastigheter och Byggnad
Examensarbete Master nummer	TRITA-FOB-PrK-MASTER-2017:45
Arkivnummer	503
Handledare	Tina Karrbom Gustavsson, tekn. dr, universitetslektor
Nyckelord	Safety management, safety manager, boundary spanning, communities of practice, human resource management

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## Sammanfattning

Arbetsmiljö och säkerhet är ett viktigt ämne inom byggbranschen. Många olika strategier och metoder för att förbättra arbetsmiljön finns också tillgängliga. Trots detta inträffar alltför många olycksfall. Denna studie undersöker strategin att anställa en safety manager i den svenska byggbranschen för att främja en bättre säkerhetskultur samt diskuterar hur en safety manager bör utöva sin profession.

Ett kvalitativt abduktivt arbetssätt har tillämpats där intervjuer och observationer har växlats med litteraturstudier för att erhålla förståelse av ämnet. Studien är en multipel tvärsnittsfallstudie med semistrukturerade intervjuer samt en mindre enkätundersökning. Studien omfattar tre projekt i ett svenskt företag. Det teoretiska perspektivet utgår från, samt begränsas av koncepten human resource management (HRM), communities of practice och boundary spanning.

Resultatet visar att safety managern kan fungera som en boundary role som länkar ihop olika osynkroniserade communities. Det identifieras att effektiv boundary spanning kan ske mellan HR-avdelningen och projektorganisationerna samt mellan produktionsledningen och yrkesarbetarna inom projektorganisationerna. Safety managern blir en double-sided boundary spanner som knowledge broker samt en support för anställda för att främja en god säkerhetskultur. Resultatet visar samtidigt att det råder oklarheter kring rollen och att bland annat ansvarsområden behöver förtydligas för att nå full potential.

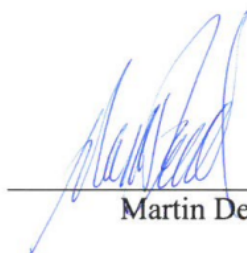
Studien bidrar med insikter i hur safety manager-rollen uppfattas och hur den fungerar, samt hur den kan förbättras. Vidare bidrar studien med förståelse för hur rollen kan främja kunskapsöverföring avseende arbetsmiljö mellan communities där hög grad av tyst kunskap råder.

## Förord

Detta examensarbete har skrivits som avslutande del av författarnas civilingenjörsutbildning inom Samhällsbyggnad med inriktning byggprojektledning, vid institutionen för fastigheter och byggande och skolan för arkitektur och samhällsbyggnad vid Kungliga Tekniska Högskolan, KTH. Vi vill uttrycka vår stora tacksamhet till vår handledare Tina Karrbom Gustavsson, tekn. dr, universitetslektor, som bidragit med hennes expertis och engagemang samt vägledning under hela processen för examensarbetet.

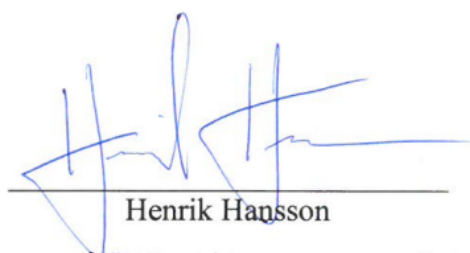
Studien har utförts i samarbete med regionen Hus Stockholm Nord inom Skanska Sverige AB. Vi vill även rikta ett stort tack till våra handledare från Skanska, Jessica Pondman Lagerström (Regional arbetsmiljöutvecklare) och Louise Bävertoft Nyberg (Regionutvecklingschef), för deras engagemang och vägledning under hela processen.

Stockholm, Juni 2017



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Martin Desmond



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Henrik Hansson

## Abbreviation and Swedish translation

BM	Block manager	Blockchef
CM	Construction manager	Platschef/produktionschef
DM	District manager	Distriktschef
PM	Project manager	Projektchef
PS	Production supervisor	Arbetsledare
SR	Safety representative	Skyddsombud
	Team leader	Lag BAS
	Worker	Yrkesarbetare
BAM	Better work environment	Bättre Arbetsmiljö
BIA	Platform to report incidence	Plattform för att rapportera tillbud
FLF		Förstärkt ledningsfunktion
IFE	Injury-Free Environment	Individ – Förebild - Engagemang
KIS	Brief information on safety	Kort information om säkerhet
Vsaa	'Our way to work'	Vårt sätt att arbeta
	Appointed by client	Uppdragstagare
	Work preparation	Arbetsberedning

# Table of Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Research purpose and questions	2
1.2	Limitations	2
1.3	Disposition	3
<b>2</b>	<b>Method</b>	<b>4</b>
2.1	Research approach	4
2.2	Information collection	5
2.3	Quality of research	6
2.3.1	Criticism of methodology and sources	6
2.3.2	Validity and reliability	7
2.3.3	Research ethics	8
2.4	Aspects of sustainability	8
<b>3</b>	<b>Construction Safety Management</b>	<b>9</b>
3.1	Causes of accidents	11
3.2	Managing secondary causes	12
3.3	Safety Climate and Culture	13
3.3.1	Policies	13
3.3.2	Safety climate	13
3.3.3	Safety culture	13
3.4	Organisational theory	15
3.4.1	Organisational culture	16
<b>4</b>	<b>Theoretical Framework</b>	<b>18</b>
4.1	Human Resource Management	18
4.2	Communities of practice	19
4.3	Boundary roles and boundary spanners	20
4.3.1	Different approaches of boundary spanning	21
<b>5</b>	<b>Skanska AB</b>	<b>22</b>
5.1	Safety policy	22
5.2	Injury Free Environment - IFE	23
5.3	Distribution of responsibilities and duties	23

5.4	Support functions in the organisation.....	25
5.5	Safety Representative .....	25
5.6	Work environment and the Swedish Law.....	26
<b>6</b>	<b>Narrating the role of Safety Managers in Construction Projects.....</b>	<b>27</b>
6.1	Vision and strategy.....	27
6.1.1	The new role is born.....	27
6.1.2	Current role description of the safety manager .....	28
6.2	Safety managers in practice.....	29
6.2.1	Bridging the knowledge gap .....	29
6.2.2	Negotiation and inclusion through employee support.....	31
6.2.3	Support through monitoring and controlling.....	32
6.2.4	In pursuit of an identity and defining boundaries .....	33
<b>7</b>	<b>Discussion.....</b>	<b>35</b>
7.1	The interplay of communities - understanding the social aspects .....	35
7.2	Safety manager as knowledge broker.....	36
7.3	Safety manager as an employee support .....	37
7.4	Delimiting boundaries .....	38
<b>8</b>	<b>Conclusion and recommendations.....</b>	<b>39</b>
8.1	Research questions .....	40
<b>9</b>	<b>Future research .....</b>	<b>41</b>
<b>10</b>	<b>References .....</b>	<b>42</b>
<b>11</b>	<b>Appendix.....</b>	<b>1</b>
11.1	Appendix A - Open ended questions .....	1
11.2	Appendix B – Survey questions.....	2
11.3	Appendix C - Results from survey.....	4



# 1 Introduction

Safety is an important concern within the construction industry and there are many different management strategies to prevent accidents. However, the accident incidence is still unacceptably high, despite ambitious efforts to improve safety in most developed countries (Aulin and Capone 2010; Pousette and Törner 2009; Hallowell 2012; Lingard and Rowlinson, 2005), as well as in the Swedish construction industry (Samuelson 2015). Zou and Sunindijo (2015) argue that big construction companies in developed economies have realised the importance of strategic safety management and that the safety performance has improved during the past decades.

Hallowell (2009) argues that accidents and injuries also cost a lot of money for the construction companies, apart from causing harm to workers and their families. However, even though accidents are costly, investments in safety management are often considered as expensive and only necessary to avoid government fines (Zou and Sunindijo 2015). This perception is paradoxical, considering the fact that active accident prevention improves business performance (Hallowell 2009; Winch 2010; Levitt and Samuelson 1993; Usmen and Vilnitis 2015). Big construction companies know that safety aspects have to be integrated into all decision making and Zou and Sunindijo (2015) say that good safety management is a way to achieve organisational integration. Organisations that perform well-functioning safety management are more likely to understand how different operations affect each other and that productivity will follow if a company has excellent safety (Usmen and Vilnitis 2015).

Many researchers have studied different safety management strategies (Esmaeili and Hallowell 2010) and there is a rigorous supply of safety management literature (e.g. Lingard and Rowlinson 2005; Sunindijo and Zou 2015). According to Pousette and Törner (2009), an engineering approach to safety management in construction is common, but it needs to be supplemented by social measures - interaction between organisational functions and levels is important. Factors such as corporate culture, collective values, safety competence, training and the ability to manage knowledge are vital for high-performing organisations (Hallowell 2012; Lingard and Rowlinson 2005). Pousette and Törner (2009) also emphasise the importance of clear responsibilities between different professional roles, and Aulin and Capone (2010) even argue that defining accountability on site is the most important element to achieve a higher safety standard.

A common and well established professional role in many countries e.g. UK and the US is the safety manager role (Lingard and Rowlinson 2005). According to Calhoun and Hallowell (2011), the employment of a site time safety manager is an effective accident prevention strategy and it enhances the effectiveness of other safety program elements. This strategy is, however, unusual in Sweden and for Skanska Sverige, which is one of biggest construction companies in Sweden. Skanska Sverige has recently implemented the strategy to employ a site safety manager in several construction projects on a trial and error basis. The impact of this new role on concerned projects and project members is not previously investigated. Moreover, this study adapts an unusual theoretical safety- knowledge management approach to the role of the safety manager, where there is a present knowledge gap (Esmaeili and Hallowell 2010; Hallowell 2012), and the findings provide insights to the existing safety management theory. Hence, this study focuses on the employment of a site safety manager and the development of this role in a well-established construction company in Sweden.

## 1.1 Research purpose and questions

The purpose of this research is to investigate the employment of a safety manager in a Swedish construction company. The aim is to gain an understanding of how the new role is adapted in a well-established Swedish construction company, the division of safety responsibilities in the PBO and the safety manager's assignments. The research attempts to create clarity regarding the safety manager's role and professional function, to do so, the following research questions will be answered:

- What are the objectives of employing a safety manager?
- What are the safety manager's responsibilities and what should they be in order to achieve the objectives?
- How is the safety manager perceived and how should they support the project based organisations?

## 1.2 Limitations

The research is limited to three projects of a Swedish construction company. The study focus on understanding the employment of a safety manager in the phase of execution, the design phase is thus not regarded. The study is limited to an interview study with a short survey, and the limitation of respondents in each project is furthered discussed in Chapter 2 - Method.

## 1.3 Disposition

The disposition of the master thesis is summarised in order to clarify its contents for the reader.

### *Chapter 1 – Introduction*

In this chapter, the reader is introduced to the background of the thesis and the identified research gap. Further on, aim of the thesis and research questions are presented.

### *Chapter 2 – Method*

Chapter 2 presents the research design and a reflection of why the particular design is employed. Moreover, limitation of the research as well as its credibility, reliability and ethical issues are discussed.

### *Chapter 3 – Construction Safety Management*

This chapter presents a review of established principles of construction safety management with the aim to provide an understanding of the importance of behavioural and cultural aspects in occupational health and safety.

### *Chapter 4 – Theoretical Framework*

The theoretical framework consists of interrelated theoretical concepts which guide the literature research and the analysis of empirical findings.

### *Chapter 5 – Skanska AB*

Chapter 5 contains a presentation of the company Skanska AB, their safety policies and some of Skanska Sverige ABs strategies to work with and develop safety management.

### *Chapter 6 – Narrating the role of the Safety Managers in Construction Projects*

In this chapter, the empirical findings of the research are presented; the vision of the safety manager and a depiction of the safety manager in practice.

### *Chapter 7 – Discussion*

Chapter 7 contains an analysis of the empirical findings and the literature study in relation to the theoretical concepts presented in chapter 4.

### *Chapter 8 – Conclusion and recommendations*

This chapter presents concluding comments and recommendations on the role of safety manager at Skanska Sverige AB.

## 2 Method

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*The following chapter contains a depiction of the chosen research topic, the research design and a reflection of why the particular research design is employed. The research approach with its limitations as well as credibility, reliability and ethical issues are presented in this chapter to critically reflect on the employed research design. The chapter ends with addressing aspects of sustainability of the study.*

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### 2.1 Research approach

The research topic of this thesis was developed by the authors along with the interests of Skanska Sverige AB, with supervision of Tina Karrbom-Gustavsson, Dr. Tech, associate professor, at the Royal Institute of Technology. The study comprises an interview study of three projects in Stockholm, performed by Skanska Sverige AB. With a cross sectional design, information was collected by a mixed methods approach, with interviews as the main source and a short survey as secondary source.

The authors had an initial desire to study health and safety strategies in the construction industry. Skanska and the supervisor at KTH encouraged further elaboration of the chosen research topic, which was further defined in collaboration with Skanska to encapsulate the employment of a safety manager as a strategy to improve the safety management in the organisation. Thereafter, the literature study commenced in order to increase the understanding of the subject and explore the diversity of published researches relevant to safety management.

When conducting the literature study, two search engines were mainly used, Google Scholar and KTH Primo. The majority of sources used in the literature review are peer reviewed articles. However, to get a better picture of the subject it was necessary to study sources such as books and reports with contextual information. In addition to the literature, Skanska's internal documents supported with an increased understanding of how Skanska manage safety within the company and the organisational structure. Moreover, iteration of the literature study with early empirical findings contributed to a deeper understanding of the safety manager's role in the organisation and the interplay of the theoretical concepts. During this process, the theoretical framework changed from initially elaborating on the safety manager as a change agent in an organisation to looking at the role as a boundary spanner between communities of practice and the essence of knowledge brokering and sense making to improve safety.

## 2.2 Information collection

To obtain an extensive collection of data in the attempt to narrate the role of the safety manager a wide range of professions were interviewed in the chosen projects (see table 1). The interviews were semi-structured, with a certain set of open questions (see Appendix A). This procedure made it possible for the authors to adapt additional questions to the specific respondent in order to increase the value of each interview to the research. In addition to the interviews, respondents answered a short survey comprising 11 questions (see Appendix B). The results of the survey are only presented in Appendix C – the reason for this is discussed in Chapter 2 – Validity. The duration of the interviews is the time of the interview, starting after the respondent was introduced to the research topic till the end of the interview, which explains the short duration of the interviews. Moreover, the authors participated in a ‘Safety Collaboration Meeting’, a platform where work environment developers, work environment engineers and safety managers meet to discuss safety procedures and address issues in the HR support and on work sites.

**Table 1:** A summary of interviewed respondents, each given an abbreviation that is used when cited in the report.

<b>Respondent [abbreviation]</b>	<b>Role</b>	<b>Duration [hours, minutes]</b>	<b>Date [year-month-date]</b>
CM1	Construction Manager	0h, 17 min	2017-03-10
CM2	Construction Manager	0h, 14 min	2017-03-21
CM3 & 4	Construction Manager	0h, 15 min	2017-03-21
DM1	District Manager	0h, 20 min	2017-03-17
DM2	District Manager	0h, 17 min	2017-04-05
PM1	Project Manager	0h, 35 min	2017-03-16
PM2	Project Manager	0h, 16 min	2017-03-27
SM1	Safety Manager	0h, 43 min	2017-02-14
SM2	Safety Manager	0h, 23 min	2017-03-17
SM3	Safety Manager	0h, 22 min	2017-03-21
PS1 & 2	Production Supervisor	0h, 10 min	2017-03-17
PS3	Production Supervisor	0h, 13 min	2017-03-21
PS4 & 5	Production Supervisor	0h, 10 min	2017-03-10
AMI	Work environment engineer	0h, 31min	2017-03-20
SR1	Safety Representative	0h, 12 min	2017-03-21
SR2	Safety Representative	0h, 18 min	2017-03-10

## 2.3 Quality of research

### 2.3.1 Criticism of methodology and sources

The study is based on an incomplete observation, given the interview study of three projects of a single construction company, to give a best prediction in answering the research questions, and is thus an abductive research (Alvesson and Sköldbberg 2009). The research take on an exploratory approach as it attempts to clarify and understand the employment of a safety manager. The principal ways of conducting such study are; literature study, collection of qualitative data by interviews and focus group interviews (Saunders et al. 2009).

Based on the principal ways of conducting an exploratory study, semi-structured interviews with a cross-sectional design served as a main source of empirical data, as it is a prevalent approach of qualitative research (Saunders et al. 2009). Furthermore, the purpose of collecting quantitative data by having the respondents answering a short survey was to triangulate the findings of the semi-structured interviews and aid the research to assimilate the respondent's perception of employing a safety manager. However, the validity of the findings from the survey are considered to be of low validity and is therefore only presented in the appendix. The study comprises 16 interviews of chosen respondents working with or within the projects that were studied.

The aim was to interview respondents one-on-one and to interview all of the above mentioned respondents. However, some respondents did not have time that was required to perform such interviews which resulted in that some interviews were performed with two respondents simultaneously (see table 1). Moreover, the fact that the research comprised three projects consisting of numerous of subcontractors and workers, made it difficult to cover all desired professions. Unfortunately, there was no or little possibility to interview subcontractors and workers to a satisfyingly extent due to restricted access to work sites and that the study would have inflicted on the project time and the expenses of both subcontractors and Skanska. However, even though subcontractors and workers could not be interviewed, some of them were given surveys in order to get a vague picture of their perception of the safety manager on site.

Sources that featured the development of the literature study and the theoretical framework has been critically reviewed. The chosen peer reviewed articles, published in scientific journals and written by credible authors are the main source. Recently published journals have been combined with well-established theories to further deepen the theoretical understanding. Sources, other than peer reviewed articles, such as books, reports and web-pages has contributed to the development of ideas and supplied with information not found in the articles. However, these sources have been critically studied due to their nature of being less valid.

### 2.3.2 Validity and reliability

There is an ongoing debate on whether the classical views of validity and reliability are applicable for qualitative research (Golafshani 2003). However, in this paper, internal validity is referred to as the extent the study corresponds to the reality and the external validity as a measure of generalizability or transferability, thus if the findings can be transferred to other populations or contexts. (Bhattacharjee 2012; Saunders et al. 2009; Trochim et al. 2016). Evaluation of reliability, on the other hand, addresses any errors or bias present in the study (Robson 2002; in Saunders et al. 2009).

#### *Validity*

Since the thesis take on a qualitative research with interviews as a main source for empirical data, it follows that the validity of findings depends to a great extent on to the credibility of the interviewees. To consolidate internal validity, respondents were chosen depending on their professional role in the organisation. In each case, the spectrum, from district manager to on site personnel was targeted to obtain a wide range of narratives of different professions in the organisation. Moreover, external validity was augmented by studying three unique projects with different settings, personnel and performed by different business units of Skanska. This would thus increase the possibility to generalise the findings and make it possible to apply it in other contexts. However, due to the uniqueness of each project and the fact that each project is performed by Skanska may impose difficulties of generalisation.

The short survey was answered by the interviewees but only eleven subcontractors and four workers in one out of three projects. Due to a very small sample of respondents, the validity of the short survey is thus very low. In addition, the subcontractors answering the survey were the 'team leaders' and not the on site workers, implying even less validity. The results are not used to draw any conclusion, however, it gives a vague hint of how the safety manager is perceived by employees of Skanska and subcontractors.

#### *Reliability*

All interviews were conducted in a closed setting to enhance a relaxed environment. Interviews commenced with an informal conversation and a briefing of the research purposes. Thereafter the respondent was given a short survey to become comfortable with the topic, before the interview commenced. This method was used in order to increase the likelihood of obtaining truthful answers and decrease the risk of participant bias (Saunders et al. 2009). Most interviews were conducted with a single respondent, however, three interviews were performed with two respondents. Even though the respondents had the same professional role, this might have implicated respondent bias with one respondent affecting the other or that they both were affected by the setting of the interview.

The semi-structured interviews followed a set of open-ended questions without leading character to encourage a natural conversation and for the respondent to answer freely. By designing an interview guide, with supervision of Tina Karrbom Gustavsson, and by having both authors participating in all interviews but one, minimised implications of observer bias and observer errors.

With the consent of the respondents, each interview was recorded and transcribed. This made it possible for the interviewers to pay full attention to conversation and to surveil how the respondent behaved when answering the questions. This procedure lowered the risk of observer error and that the findings from the interviews are correctly narrated. Furthermore, the interviews were conducted in Swedish to minimise language barriers which could have led to participant error.

By covering many professional roles of the PBO and with a fairly even allotment of respondents of the different professions, the risk of participant bias of a certain profession or target group was minimised which thus improved the reliability of the obtained empirics.

### 2.3.3 Research ethics

Collaboration with a sponsor may imply coercion of the sponsor's interests, however, this was not found as an issue. The collaboration between the researchers and the sponsor was sound and the interests of both actors were taken into consideration when developing the research topic.

To obtain informed consent, respondents were given full information of participation rights, use of data and that participation was voluntary, before the interviews commenced. With the consent of the participant, each interview was recorded on audio file. Furthermore, all respondents are given anonymity. However, it is needed, for the value of the thesis, to use an abbreviation for each respondent that reflects the person's profession.

One of the researchers has previously been employed in one of the projects that were studied and thus have an existing nature of relationships to some of the respondents. However, having a second researcher without previous connection to the company was an aid in overcoming bias and improved maintenance of objectivity when conducting interviews, and in the analysis of the findings.

## 2.4 Aspects of sustainability

The research topic focus in large extent on the social aspects of employing a safety manager, how the role is perceived in the organisation and the relational power struggles and thus, social sustainability is relevant to this research. Economical sustainability has been regarded during the research but has not been closely studied. Environmental sustainability on the other hand has not been regarded in the research due to little relevance to the research topic.



### 3 Construction Safety Management

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*This chapter presents a review of established principles of construction safety management. The aim is to provide an understanding of the importance of behavioural and cultural aspects in occupational health and safety.*

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According to Holt (2005), safety is the absence of danger, a state of protection or a condition not involving risk. However, there is no arbitrary state of absolute safety, there is always a risk of something going wrong. The word health is often used in company with safety and both words describe varying and relative states of wellness. The word of safety is used in an everyday sense to convey the idea that workers should not leave their work less healthy than when they arrived. The management of occupational health and occupational safety to ensure a safe work environment is done together and in the same way, therefore the word safety is usually used to mean both (ibid.), which it is in this study as well.

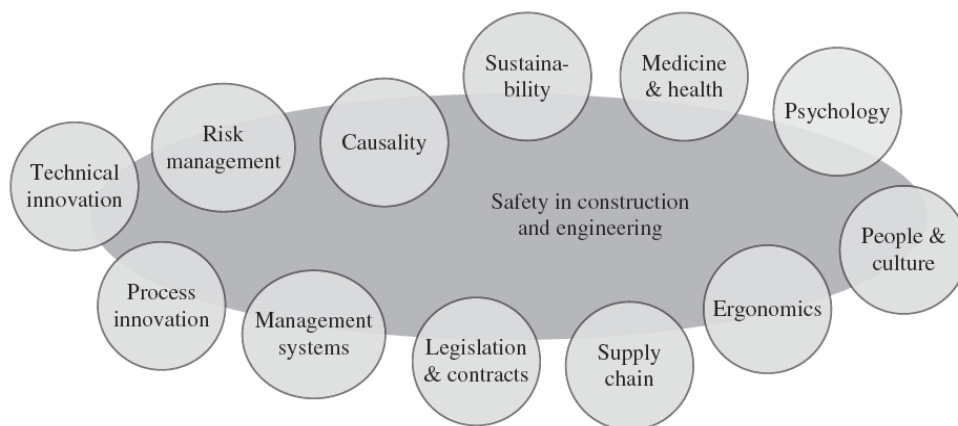
Holt (2005) defines an accident as a potential product of an incident: “*the end product of a sequence of events or actions resulting in an undesired consequence (injury, property damage, interruption, delay)*”. Accidents are possible outcomes of incidents and luck or the element of chance is only concerned with the physical outcome, the consequence, of an incident. Sunindijo and Zou (2015) state that 50-90% of all accidents are caused by human error and that safety improvement can only be achieved through an attention to human behaviour mechanisms. Holt (2005) states that only a minority of the incidents that occur in the construction industry cause injuries or accidents, thus injury records only provide a limited review of all incidents that occur on site.

Sunindijo and Zou (2015) describe several unique characteristics of the construction industry which affect how organisations operate and how they manage safety. A few examples are that the industry is complex due to:

- interdependence among activities,
- the uniqueness of every project,
- a lack of complete specification for activities on site,
- its decentralised approach to decision making,
- the low levels of entry to the sector,
- the subcontracting practice,
- the labour intensive workforce and
- the gender imbalance which creates a problematic “tough” identity and hierarchy resistant to change.

The uniqueness and project based nature of the industry further make it difficult to standardise activities and constraints the impact of learning because the teams need to re-learn every time they move to a new project (ibid.). They further conclude that developed economies have made improvements in safety through the use of systems and modern technology. However, the improvements have plateaued in recent years and the human factor is particularly important due to the industry characteristics (Lingard and Rowlinson 2005; Sunindijo and Zou 2015).

Alli (2008) defines occupational health and safety as “the science of the the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment.” This vast domain includes many disciplines and Finneran and Gibb (2013) argue health and safety management in construction interfaces with many other areas of research. This means that researchers combine safety management research with their other specialism. Figure 1 illustrates this multi-disciplinary nature and the embeddedness of each of these areas within health and safety research and development (ibid.).



**Figure 1:** Indicative interfaces between safety and other domains of practice and research (Finneran and Gibb 2013).

All managers are responsible for the work environment and thus has to control the unsafe activities and conditions that can result in accidents (Holt 2005). An encouraging safety climate that fosters good practices is vital, since control of workers and their behaviour is difficult. Management of safety behaviour is a key challenge in improving construction safety (Ding et al. 2016). Unsafe work is a result of poor safety culture, inadequate allocation of resources and time and lack of training (ibid.). Workers need training to develop skills to identify and comply with safe work methods and to report unsafe conditions. However, due to the highly mobile and transient workforce performing the work that is constantly changing, the workforce is more difficult to train, motivate and involve in corporate safety efforts and therein lies the challenge (Holt 2005).

### 3.1 Causes of accidents

Unsafe acts and conditions are primary causes of accidents, as they are usually directly involved at the moment the accident happens. Lack of training, planning and safe work systems are secondary causes and more difficult to identify (Holt 2005). The latter causes are failure of the management team to plan, educate and implement safe systems. Holt (2005) describes primary causes of accidents as symptoms of underlying secondary causes. Safety laws have historically targeted primary causes of accidents. However, legal requirements that address secondary causes have begun to emerge in several countries in order to bring attention to organisational aspects of safety management (ibid.). Some examples of primary and secondary causes are listed below:

#### **Unsafe acts**

- Working without authority
- Failure to warn others of danger
- Leaving equipment in a dangerous position
- Using equipment wrong
- Disconnecting safety devices
- Using defective equipment
- Failure to use or wear personal safety equipment
- Failure to lift loads correctly
- Use of alcohol or drugs

#### **Unsafe conditions**

- Inadequate or missing guards to moving machine parts
- Missing guardrails
- Defective equipment
- Inadequate fire warning systems and fire hazards
- Unsafe atmospheric conditions

#### **Secondary causes of accidents**

- Lack of commitment
- Lack of policy
- Lack of standards
- Lack of knowledge and information
- Restricted training
- Poor quality control systems resulting from the above
- Group attitudes
- Trade customs

- Industry tradition
- Acceptable behaviour in the workplace
- Commercial/financial pressures between contractors

### 3.2 Managing secondary causes

According to Esmaeili and Hallowell (2012), there are hundreds of different injury prevention strategies and they identify 13 as highly effective. Accident prevention is more than setting up a list of rules and making safety inspections. Holt (2005) argues that a system for managing health and safety that complies with the needs of the business and the law is necessary. This system should consist of seven principles to be observed in setting up strategies for control and management of health and safety, two of which are especially concerned with secondary social and behavioural aspects (ibid.):

- Ensure everyone understands what they have to do to be safe and healthy at work
  - Safety training is not just a matter of handing out booklets, people's previous experience might be unknown and their ability to assimilate the information may differ.
- Make sure health and safety management is accepted by everyone, and that it applies to all aspects of the organisation's activities.
  - The importance of the safety climate and the culture.

Among the 13 highly effective safety program elements identified by Esmaeili and Hallowell (2012), six strategies are directly connected to the principles above:

- Upper management support
- Project-specific training
- Safety manager on site
- Safety and health committees
- Safety and health orientation
- Employee involvement

Accordingly, almost 50% of these highly effective safety program elements refer to the importance of employee support, employee inclusion, training and safety knowledge management and a good safety climate (ibid.). Hallowell (2009) defines the site safety manager as a professional with formal occupational health and safety education or training and whose primary responsibility is to implement safety programme elements and be a resource for employees. In addition, Calhoun and Hallowell (2011) states that the site safety manager increases the effectiveness of other safety program elements.

Moreover, Lingard and Rowlinson (2005) emphasise the importance of induction training and continuous re-training in construction projects as techniques to uphold a satisfactory health and safety performance. Poor safety performance often derives from insufficient training (Burke et al. 2011), and Bahn and Barratt-Pugh (2012) even concludes that mandatory induction training can enhance organisational safety culture.

### 3.3 Safety Climate and Culture

#### 3.3.1 Policies

Successful safety management demands comprehensive health and safety policies which have to be implemented and considered in all business practice (Esmaeili and Hallowell 2012; Holt 2005). Policies are essential as they explain and assign responsibilities, which provide accountability of safety programs. It follows that policies become effective with consistent management and employee commitment which fosters an organisation with high safety standard and create a sound safety culture (Holt 2005).

According to Lingard et al. (2012), managers at different levels, including senior managers and supervisors, have a significant impact upon safety performance in the construction industry. Moreover, workers develop “*shared perceptions of the safety response of referent others, including senior managers, supervisors and co-workers*” (Lingard et al. 2012). Thus, Lingard et al. (2012) highlight the importance of first level supervisors in translating organisational safety policies and procedures into workgroup safety practices.

#### 3.3.2 Safety climate

Safety climate and safety culture are commonly misconceived or perceived as the same thing (Sunindijo and Zou 2015). There is a range of definitions for safety climate, however, they can all be summarized by “*the employees’ perception and attitudes towards safety in the organisation or in their workplace ... safety climate measures these perceptions and attitudes at a certain point in time*” (ibid.). The safety climate is dynamic and may change over time and in space thus, an organisation may have different levels of safety climate in different segments of the organisation and even within the same project (Sunindijo and Zour 2015).

#### 3.3.3 Safety culture

According to Lingard and Rowlinson (2005), safety culture is a subset of organisational culture, and in a positive safety culture, everybody is continually looking out for hazards and raises any safety concerns with supervisors and managers. Sunindijo and Zou (2015) define safety culture as “*an assembly of individual and group beliefs, norms, attitudes, and technical practices that are concerned with minimising safety risks and exposure of workers and the public to unsafe act and conditions in the construction environment*”.

Safety culture can be divided into three interrelated dimensions: corporate (policies, procedures, systems and communication), psychological (refers to the safety climate of the organisation - attitudes and perception of individuals) and behavioural (safety-related activities, actions etc.) (ibid.). Kletz (1985, in Lingard and Rowlinson 2005) argues that culture is more influential of workers' behaviour than many safety professionals acknowledge. Accordingly, he suggests it is insufficient to implement a paper system with formal policy statements to achieve company objectives, since it is essential to win the *hearts and minds* of workers in order to achieve a common commitment to the implementation of these policies.

Some examples of sound safety culture characteristics or signs are as follows (Ostrom et al. 1993; Zou 2011):

- Values of and beliefs in occupational safety are acknowledged and shared within the organisation;
- Workers should be alert for unexpected changes and the work climate encourages people to ask for help when they encounter problems have to prevail;
- Workers assimilate available information to improve safety performance;
- The organisation review the applied safety management system on a regular basis;
- The organisation promote individuals that identify innovative ways to identify and assess potential safety hazards;
- The organisation has effective strategies to gather safety-related information, measure safety performance and unite people to learn how to work more safely.

Molenaar et al. (2009) identified perceptions of managers' response to safety as the most influential determinant of safety performance in construction projects. They say that corporate culture is very complex to define and they identify five characteristics of corporate safety culture that may be used as indicators of safety performance: a company's safety commitment, incentives provided to field personnel, subcontractor involvement, clear accountability and use of disincentives for unsafe behaviour. Moreover, the safety culture is closely related to the learning process in the industry practice. Gherardi and Nicolini (2002) express that besides learning from formal channels, safety learning is about taking part in the social world, which implies that learning takes place among and through others at work. They highlight social and cultural aspects of safety knowledge and that the concept of communities of practice is central for transmitting practical knowledge (ibid.).

### 3.4 Organisational theory

Organisational theory aids our perception to understand and explain why organisations operate as they do (Jacobsen and Thorsvik 2014). The organisation is a social system, consciously constructed to reach specific goals by chosen organisational strategies (Etzioni 1982). Studying the organisation as a social system, the interplay of interdependent individuals, urge a need to gain insight of the intrinsic social and human behaviours that characterise the organisation (Coase 1937). Where Barney (1991) argues that human capital and organisational capital, highly relevant to the social context of workers, are two out of three qualities a firm should enhance to sustain or improve competitive advantage:

- *Human capital*: training, experience, judgement, intelligence, competence as well as relationships of individual managers and workers in a firm.
- *Organisational capital*: formal structures such as reporting, planning, controlling and coordinating systems as well as informal relations within and between the firms.

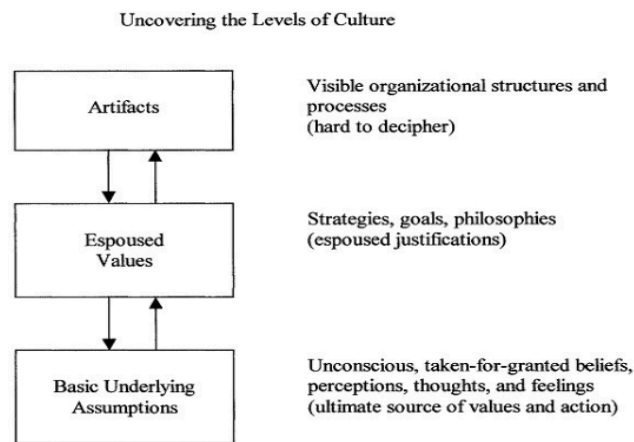
Management of above resources is essential to uphold a high quality performance of an organisation (Jacobsen and Thorsvik 2014). In this report, management of human capital and organisational capital is further elaborated as it is pertinent to the practice of Human Resource Management (HRM) (Turner et al. 2008; Bredin and Söderlund 2006). Definitions of human resources and human resource management in the literatures are many and somewhat diverse. Human resources are said to be the interrelated, interdependent and interacting physiological, psychological, sociological and ethological components (Jucius 1955). It could also be defined as the human capital of the organisation; intellectual, social and emotional capital (Nahapiet and Sumantra 1998). Furthermore, Khanaka (2007) refer human resources as the quantitative and qualitative modality of humans in an organisation. Human resource management could thus be defined as the management of components making up the human capital of the organisation. A more elaborate definition of human resource management is; “*a process of procuring developing and maintaining competent human resources in the organisation so that the goals of an organisation are achieved in an effective and efficient manner ... an art of managing people in such a manner that they give their best to the organisation*” (Khanaka 2007). All definitions are related to the two resources, human and organisational capital which Barney (1991) argued for to be essential for the organisation.

To simplify the social contexts of an organisation, a split can be made between formal context and informal context (Jacobsen and Thorsvik 2014; Karlöf and Lövingsson 2007). The formal context relates to organisational strategies and structures (Jacobsen and Thorsvik 2014), in other words the design of the organisation (Miller et al. 2009). The informal context on the other hand, is the culture of an organisation and the relational power struggles in it. It follows that the informal components may strengthen or weaken the effect the formal context on employees e.g. existence of norms are or aren't aligned with the scope or the ethics of the organisation (Jacobsen and Thorsvik 2014).

### 3.4.1 Organisational culture

The operational system that the organisation adopts supports as guidelines, routines and imply a certain distribution of duties, which ultimately foster the organisational culture (Jacobsen and Thorsvik 2014). A disputed statement within organisational theory is that organisational culture can be viewed as strategic importance for increased competitive advantage (Barney and Clark 2007). It follows that modern studies point out that there is a correlation of organisational culture and effectivity (Hartnell et al. 2011), meanwhile Dong et al. 2011 argue that organisational culture might have injurious effects on knowledge sharing if not properly fostered.

In the literature, Schein's model of organisational culture is oftentimes a starting point to elaborate on an organisation's culture. The model, see figure 2, illustrate interrelated aspects; artefacts, espoused values and basic underlying assumptions, and their visibility within the organisation. Artefacts are physical things or visible processes. Espoused values on the other hand are general opinions and philosophies, also found in written statements (Schein 1985). Drawing on Schien (1985), Marker (2010) explains espoused values as only partially visible. However, to fully understand organisational culture one must interact with employees in their social context to gain insight of the basic underlying assumptions (Marker 2010). Despite being the least visible components of the model, these assumptions pose the greatest influence on organisational culture (Wiewiora et al. 2013).



**Figure 2:** Uncovering the levels of culture (Schein 1985).



The division of organisation culture vary in many ways, however, a valid division widely used in existing research is that of individualism-collectivism, uncertainty avoidance and power distance (Dong et al. 2011). The aspect of individualism and collectivism is a well-constructed concept and important to understand the cultural effects on cooperation (Chen et al. 1998). The collectivist emphasises the importance of cooperation between members (Dong et al. 2011) and create relational boundaries between the community or the organisation and those outside of it (Chen et al. 1998). The individualist on the other hand separate the autonomous self from others, as an individual or group (communities) (Chen et al. 1998). The individualistic organisation do not encourage cooperation like the collectivists, instead they foster competition which in turn reduce cooperation (Chen et al. 1998) and sharing of knowledge (Dong et al. 2011). The individualistic or collectivistic character of the organisation reflects cultural values and internal relationships of an organisation (Chen et al. 1998). Chen et al. (1998) further argue that the characteristics of the organisation constitute the cultural foundation and values which in turn affect the organisational goals, relations and cooperation within the organisation.

## 4 Theoretical Framework

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*The theoretical framework consists of interrelated concepts that are used to analyse empirical findings. The theoretical framework guides the literature research and the analysis of empirical findings.*

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In this research, the safety manager is considered as a support function to construction projects connected to the Human Resource department. This point of view is the starting point to further elaborate and analyse the profession as a boundary spanner to mediate boundaries between communities of practice in the field of health and safety.

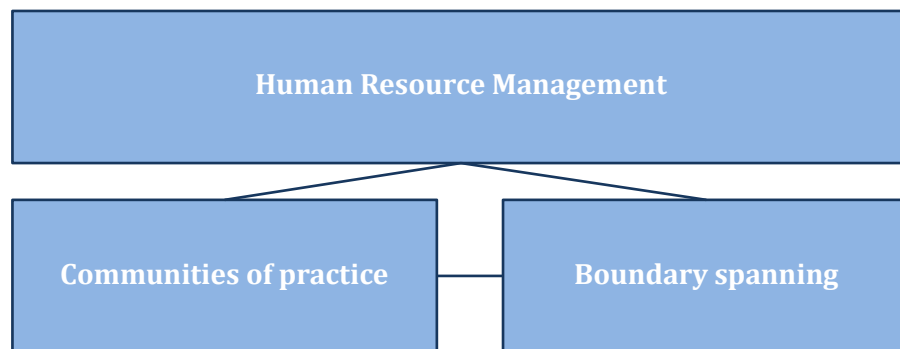
### 4.1 Human Resource Management

Turner et al. (2008) identified that project-oriented organisations impose substantial pressure on project workers due to obscure requirements, fluctuating workloads and demand of multiple roles. It follows that the development of project operations is interrelated with the development of human resource management (HRM), thus making it a vital role in dealing with the complications PBOs pose (Bredin and Söderlund 2006). The community of HRM can take two roles in a firm; a management support role, attract key competences and integrate these in firms processes and an employee support role, manage the well-being of employees in the firm (Turner et al. 2008; Bredin and Söderlund 2006).

In a case study on HRM in PBOs, Bredin and Söderlund (2006) observed apparent organisational complications in the dynamic and complex environment of the PBOs. Four key roles were identified as vital for the practices of HRM and interrelated development of project operations to deal with these complications; knowledge broker, trust builder, change agent and individual coaches. The knowledge broker was needed as organisations operating in short-term projects soar a need to efficiently manage competencies between projects and within a firm. Issue of trust is a result of continuous reallocation of project workers between temporary projects, unless HRM practice foster necessary permanence through social networks and distinct role structures. Thirdly, due to the dynamic settings of PBOs, HRM needs to manage resistance to change, e.g. through a change agent. The final issue that was observed was the issue of people. In project intensive firms great pressure is put on project workers. Engaging individual coaching for workers career development and finding a balance between work and private life may ease the pressure that comes with the nature of PBOs. (Bredin and Söderlund 2006)

A wealthy interplay between HR departments, line managers, project managers, and project workers is the essence of an effective HRM practice (Bredin and Söderlund 2006) and its quality rely on how resources are managed within the firm to increase competitive advantage (Clark and Collin 2003). Previous research tends to focus on the community of HR specialists as a management support role. However, a need for all of the above mentioned roles is

indispensable for delivering HR value to PBOs at operational level (Bredin and Södelund 2011). Moreover, the design of HRM in a firm depends on whether an intra- or inter-functional work system is used. The inter-functional project system assembles interdisciplinary professions in project teams resulting in an increased HR orientation of individual project managers and devolution of HR responsibilities (Bredin and Söderlund 2011). However, such boundary spanning delegation of responsibility often leads to failures, due to insufficient capacity of actors to manage the present novelty (Carlile, 2004). At the same time, Clark and Collin (2003) stress the controversy of shifting HR responsibilities due to risk of conflicting interests. They stress that the interests of HR practice is to support the PBO in creating effective teams, develop efficient management and overcome boundaries between communities, whilst project managers interest often times stay with following established routines. A visual presentation of the interrelated theoretical concepts is presented in figure 3.



**Figure 3:** Visual presentation of the interrelated theoretical concepts.

## 4.2 Communities of practice

The concept of communities of practice was introduced by Lave and Wenger (1991) who discussed the notion of situated learning. They argue that learning is a social process and a situated activity, which revolves around a process called legitimate peripheral participation. Communities of practice are groups of people who engage in a collective learning process in a shared domain of knowledge and a specific practice, around which the community develops (Wenger, 1998). Communities of practice can be formed naturally because of the members’ interest in a domain but it can also be constructed in order to encourage knowledge sharing to practitioners. Wenger-Trayner (2015) gives a simple definition: “*Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly*”.

The identity of a member in a community of practice is manifested through the person’s competence. Thus, identity in practice is a constant becoming as a result of interplay of participation and reification (Wenger, 1998). Moreover, identities can change as participation changes and the ongoing identities can find new paths and create trajectories related to our communities of practice. One type of trajectory is the boundary spanning trajectory that links

different communities together (Wenger, 1998). Boundaries are unavoidable as learning and creation of practices in each community is unique and is a result of the members' negotiation of meaning. Therefore, boundaries are potential areas for misunderstanding but can also be sources of innovation and learning (Wenger 2000). He further states that boundary processes are delicate brokering work and require careful management.

The community of practice perspective, which emphasises the social aspects in the learning process, provides insights in the difficulties in sharing knowledge in PBO (Evans and Scarbrough 2014; Khuzaimah and Hassan 2012). The project intense construction industry is faced with difficulties in capturing and sharing knowledge, due to its decentralised, transient and fragmented nature of the PBO (Khuzaimah and Hassan 2012). Moreover, the high level of tacit knowledge (Nonaka and Takeuchi 1995) in the industry makes the knowledge sharing even more challenging, since it is shared through socialisation which implies direct contact between individuals and sharing of experiences (Nonaka et al. 2000). Wenger (2000) argues that social systems are unpredictable and diverse processes between different social systems and communities divide them, but the social systems can develop uniformity within themselves. Even words can lack continuity of meaning across boundaries and the fact that most innovation occurs at the boundaries between domains (Carlile 2004) indicates that organisational boundaries is a central concept and that boundary spanning activities are vital. This approach offers an analytical lens to elaborate on the difficulties in reaching conformity and to develop a systematic safety knowledge management system in the construction industry.

### 4.3 Boundary roles and boundary spanners

In the literature, boundary roles are commonly referred to of having two functions; information processor and external representation, proposed by Aldrich and Herker in 1977. The boundary role as an information processor, mediate external information into the organisation and serves as a dual function in information transmittal, an information filter and an information facilitator, to resolve information overload and make sense of information. External representation on the other hand is the organisational response to environmental influence where the boundary spanners have an important role to maintain and improve the legitimacy of a community of practice (Aldrich and Herker 1977; in Gustavsson Karrbom 2015). Altogether, the boundary role is essential for an organisation's performance by virtue of communicating information. The role is also vital in compromising organisational policies and environmental constraints, to negotiate relational power and to improve legitimacy (Tushman and Scanlan 1981). Thus, investigation of interorganisational dependence originates in boundary spanning of communities of practice (Aldrich and Herker 1977).

Tushman and Scanlan (1981) pointed out that the boundary spanning role is the essence to bridge competence between communities, internal as well as external. The individual becoming a boundary spanner in practice however, is in need to possess a certain set of

qualities. Drawing on Lave and Wenger (1991), Levina and Vaast (2005) stress that the individual must be a legitimate participant in the involved fields of practice, with a peripheral understanding of each practice. Being a legitimate peripheral participant is a core competence for the boundary spanner as a negotiator of relations between practices. Furthermore, Levina and Vaast (2005) describe that the boundary spanner must also be an agent of significant symbolic capital and possess credibility in the involved communities to be a legitimate negotiator. Lastly, the boundary spanner needs to possess an urge to span boundaries, which may be derived in the expected rewards that come with the profession or the close interest to a certain field. Williams (2002) ultimately put forth the boundary spanner as a socially skilled worker managing relations of people and communities in a setting of relational power struggles, through negotiation and brokering.

#### 4.3.1 Different approaches of boundary spanning

The boundary spanner may take on different approaches depending on the setting of the project team, in which the boundary spanner work (Evans and Scarbrough 2014). In a homogeneous project team the bridging approach is adopted assuming supplementary mechanisms e.g. knowledge brokers, meeting forums and different translational activities between each community. When the project team is instead heterogeneous, a blurring approach is adopted. In this case knowledge translation occurs as a continuous and incremental process in the day-to-day practices. It follows that members from different communities implicitly pursue a mutual adaptation of practices. Each translational moment is a small scale progress, but the sum them have potential for large scale transformation of knowledge across complex boundaries in organisations (Evans and Scarbrough 2014; Carlile 2004)

Evans and Scarbrough (2014) argue that knowledge translation through bridging is achieved by transportation of knowledge between project teams to span the wide gaps between communities with different knowledge. In contrast, the knowledge created through blurring approaches involves the integration of existing knowledge, which allows many members to act as informal boundary spanners. Thus, integrating boundary roles into the daily project operations is one strategy in the pursuit of organisational ambidexterity (Eriksson 2013).

## 5 Skanska AB

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*This section contains a presentation of the company Skanska AB, their safety policies and some of their strategies to work with and develop safety.*

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Skanska AB was established in 1887 and is today one of the world's leading project development and construction groups. Skanska operate within multiple countries in Europe, in the UK and in the U.S. Skanska is a leading company within building and civil engineering projects, a provider of comprehensive construction services and is a developer of public-private partnership in the UK and U.S. (Skanska AB 2017a; Skanska AB 2017b)

Skanska Sweden operates within business streams of Construction, Residential Development, Commercial Property Development and Infrastructure Development. In Sweden there are more than 10 000 employees, working in 25 different business units and regions, and the central support functions. Skanska aims to be the leader within the development of the urban community, and to be a role model in the construction industry. The ambition is to be a striving actor of diversity, involvement, work environment and sustainability and the visions are founded on the values of Skanska, a benchmark to become a leader in urban development and build a better society. (Skanska AB 2017a; Skanska AB 2017b; Skanska AB 2017c)

Skanska's corporate values are presented below;

- Care for life
- Act Ethically and Transparently
- Be Better-Together
- Commit to customers

### 5.1 Safety policy

Skanska aims to be a world leader in construction safety (Moore, 2016). One of Skanska's values is Care for Life, which means that a Skanska workplace should be transparent and injury free. Moore (2016) states that Skanska believes that all accidents are preventable and that senior management is responsible to constitute an organisation that fulfils this commitment.

Skanska should achieve an injury free workplace by:

- Clear and visible leadership. Management must set an example of their commitment and demonstrate leadership.
- Creating a safety culture which motivates and involves all members of the organisation to behave proactive.
- Implementing processes to ensure that people are competent and have good knowledge about safety management systems throughout the organisation.

- Improving safety performance together with suppliers and contractors and monitor their performance.
- Promoting good practice in the industry and being an agent for change by creating alliances with stakeholders, such as governments and industry groups, to improve and develop safety management.
- Having an open minded dialog with stakeholders about the impact of Skanska's activities.

## 5.2 Injury Free Environment - IFE

IFE is a shortening for Injury Free Environment, an educational program that Skanska is using to foster an improved safety culture in the company. The program consists of workshops where the employee is supposed to question his or her attitude towards safety, and be inspired to take more responsibility to achieve an injury free and healthy environment. During 2015 the first division of Skanska initiated in the program, and during 2016 and 2017 other divisions will be educated (Erlandsson 2017).

The vision of IFE is to reach an injury free and healthy work environment. Many precautions have already been developed and implemented, however, this is the next step of Skanska's journey towards the vision. IFE should encourage a culture that coincides with thoughtfulness, dedication, that inspire each and every one to take responsibility for their own and their co-workers safety and wellbeing. (Erlandsson 2017)

IFE is defined by Putnam (2017) as: *"More than safety, a culture of care and concern for people, which encourages everybody to accept responsibility for their own and their colleagues well-being."*

*"The aim is to engage with the entire workforce and extend all of our behaviours such that we look out for one another to ensure that everyone returns home from work safely to their family and friends."* (Putnam 2017)

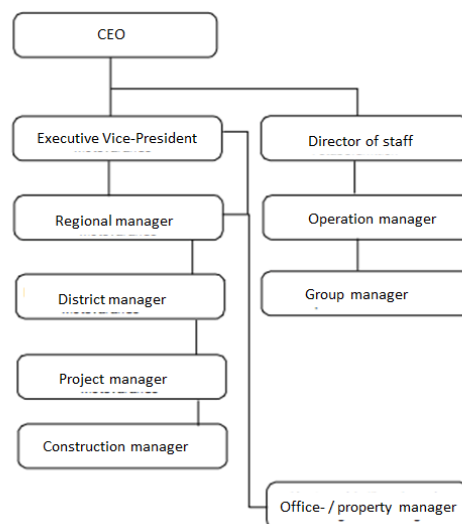
## 5.3 Distribution of responsibilities and duties

Skanska use a tool named Vsaa to plan, manage and revise any work related to work environment. As stated in the Swedish law (SFS 1977:1160) every organisation is obliged to systematically plan, manage and revise operational activities. Vsaa is one of many ways to meet these requirements. The tool is a web based knowledge source where employers find all information needed to manage, plan and execute any operation with sufficient work environment. There are many laws, provisions and internal rules to be followed, a job a single person simply cannot manage. Therefore, Skanska has distributed the responsibilities and duties within the organisation. However, distribution of responsibilities regarding the safety of people may not be done randomly. There are a set of provisions that constitute how this

may be done.

In the provision Systematic work environment management (AFS 2001:1) it is stated that an employer/autocrat is obliged to distribute duties within the organisation in a way that the requirements of the work environment are possible to meet. Distribution of duties should include authority and needed resources. At Skanska, the board allocate the responsibility for work environment management to the CEO. The responsibility cannot be allocated further, duties regarding this area on the other hand can. These are distributed in the organisation to make it possible to foster a safe work environment in the organisation and on work sites.

In Vsaa there is a steering document on how the distribution of duties may be done. At Skanska there are many prerequisites for such a distribution and the distribution of duties must be distinctly defined and documented in writing. An individual bestowed with work environment duties must possess sufficient knowledge, mandate and resources. It follows that the CEO distribute duties to subordinate managers in the organisation. It is in turn that manager's responsibility to further allocate relevant tasks to the next manager down the hierarchy, see figure 4. (Skanska AB, 2016a)



**Figure 4:** Distribution of responsibilities and duties in organisation (Skanska 2016a)

Skanska Sweden is organised into different business units. Each unit operates within a specific stream of business; construction, residential development, infrastructure development etcetera. These business units are separated into several districts containing a number of projects. Each unit has a regional manager whom allocates duties to a district managers. District managers further allocate duties to project managers and construction managers in projects within the district (Skanska AB, 2016a). The district manager is judicially responsible for safety in the given district. The district manager is foremost responsible to assign a functional project team and recruit personnel of proper education and knowledge for specific professions. It is important to acknowledge that no project is another like. The need for specific professions within a project team is therefore changing and must be adjusted to

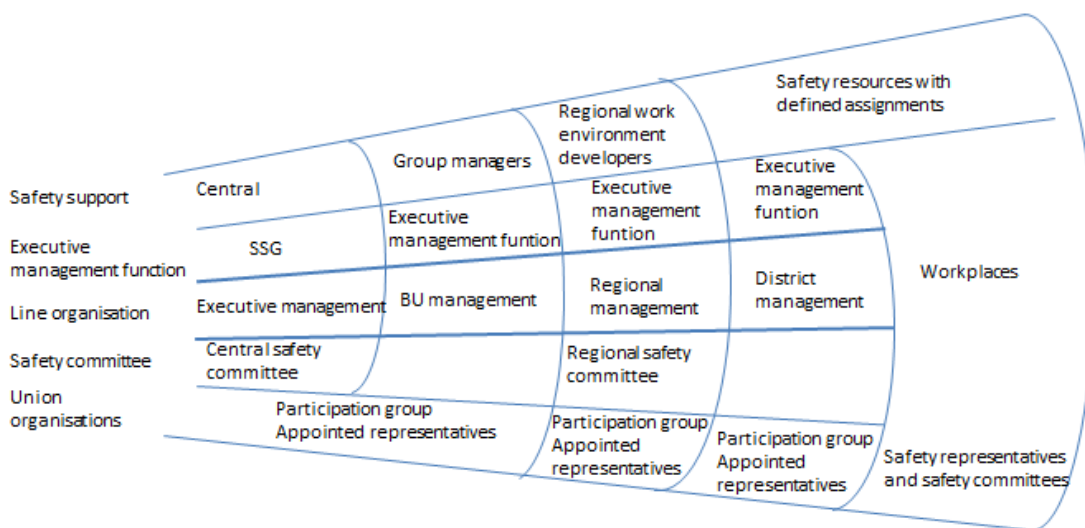


the specific project (DM1). In each project there is a project manager whom has the overall responsibility.

*“I am ultimately responsible for everything that happens within the project and towards customers. Duties are further allocated to different persons, but I am ultimately responsible”.* (PM1)

#### 5.4 Support functions in the organisation

The Health and Safety Support work with the objectives of reaching a safe and healthy work environment through support to the central and the PBO. Figure 5 clarify how the Health and Safety Support is designed. In the group “safety resource with defined assignment” we find the work environment engineers and the safety managers. This group of professionals work beneath the division of work environment developers with the support of FLF to improve safety in project organisations and on site, as figure 4 presents. Union of workers are in the bottom of the figure, where the safety representatives are found, working on site to represent the workers. (Skanska AB 2016b)



**Figure 5:** Organisational chart with internal support functions and union organisation (Skanska AB 2017a).

#### 5.5 Safety Representative

The safety representative should, according to the Swedish Work Environment Authority (2017), be a representative of employees regarding safety on the work place but without any responsibility. The safety representative has the aim to work towards a satisfyingly work environment, together with project managers, work environment engineers and the contact person of the business unit (Skanska AB 2016c). The group should address physical, psychological and social issues. Furthermore, the safety representative has the assignment to make sure that the employers fulfil the demands of systematic work environment planning (The Swedish Work Environment Authority, 2017). It is the employer's and the union's

responsibility to educate the assigned safety representative so that the person can execute the assignments accordingly. A safety representative that works at a Skanska is educated with “Better work environment” (BAM) (Skanska AB, 2017).

## 5.6 Work environment and the Swedish Law

Any work related to management of the work environment is controlled by the Work Environment Act and complementary regulations and provisions (The Swedish Work Environment Authority 2015). The general purpose of these enactments is to prevent poor health and accidents in work and to achieve satisfactory work environment (ibid). According to Swedish law, the client, or someone appointed by the client, is responsible for coordinating work environment measures throughout the construction process (Aulin and Capone 2010). The client appoints two health and safety coordinators, one is responsible for the planning stage and the other one for the execution stage (BAS P respectively BAS U). There can only be one coordinator for the planning stage and one for the execution stage at the time and their coordination responsibilities are stipulated by Swedish law.

## 6 Narrating the role of Safety Managers in Construction Projects

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*In the following section the empirical findings of the research are presented. Commencing with a presentation of the vision and strategy, the section is followed by a depiction of the safety manager in practice with the theoretical view described in Chapter 4 – Theoretical Framework, i.e. as an employee support and a boundary spanner between communities of practice.*

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### 6.1 Vision and strategy

#### 6.1.1 The new role is born

Skanska UK is the leading business unit when it comes to safety management within Skanska and has great experience in large and complex projects. Skanska Sweden has been inspired by their expertise, and the safety manager role in Sweden is a result of their influence. (DM1)

The demand for a safety manager in Swedish projects has emerged in large projects where project managers and construction managers have found it difficult to monitor the activities on site and ensure that everything is done safely, due to heavy workload (DM1-2). In recent years safety has become the number one priority at Skanska today, and the implementation of a safety manager is one initiative to improve safety (PM1). According to DM2, Skanska has to become stricter regarding safety routines and a safety manager should foster a better consciousness and a more socially sustainable environment.

A safety manager should work together with project managers, construction managers, block managers and production supervisors, to reach a well-functioning project with distinct safety coordination (BAS-U) responsibility (Gustavsson 2016). The safety manager should be on site to remind and raise awareness of safety (DM1). DM1 further states that the safety manager should have a near collaboration with the construction manager and spend most time on site and little time with administrative work. Both DM1 and DM2 believe that a safety manager has the greatest contribution to foster a wealthy safety culture by working proactively and being on site.

*“I believe that the role safety manager contribute at fullest when the assigned person foster a good safety culture in the project. That will of course include some administrative work. However, the person must be committed and communicatively skilled. The person must engage others to think of the individual and the collective safety. That is the most important thing.” (DM2)*

### 6.1.2 Current role description of the safety manager

Safety managers work closely to project managers, construction managers, block managers and production supervisors to reach a functioning project with a distinct Bas-U responsibility. The position is mainly pertinent in projects with a budget of 400 million SEK or more. (Gustavsson 2016)

#### Responsibilities

- Be the extension to project manager and construction manager on site
- An informant to support block manager and production supervisor
- Ensure that safety policies are followed to reach a safe work environment
- Safety manager should together with project manager and production Supervisor, collect and disseminate information to employees and subcontractors regarding Short Information of Safety, IFE, stall in production due to safety hazards and work preparation
- Site introduction for employees and subcontractors
- Participate in safety inspections on site
- Participate in the design phase
- Proactively appraise colleagues and subcontractors before and during initiation of project
- Participate in work preparations regarding safety and productivity
- Share successful operations of work in the project and with the district
- Participate in meetings with team leaders (Lag BAS) and safety representatives.
- Report mishaps and accidents in BIA
- Responsible to implement and revise safety standard and work environment operations
- A link to the Support group and FLF health and safety, regarding work environment jurisdictions and provisions as wells as improvements of internal standards.

**Table 2:** Education, experiences and individual skills that are required to become a safety manager

<p><b>Education</b></p> <ul style="list-style-type: none"> <li>• Worker</li> <li>• Bas-U</li> <li>• Better Work Environment (BAM)</li> </ul>	<p><b>Individual skills</b></p> <ul style="list-style-type: none"> <li>• Communicative</li> <li>• Leadership skills</li> <li>• Focus on co-operation</li> <li>• Straightforward</li> <li>• Ability to limit workload</li> <li>• Indifferent of prestige and status</li> </ul>
<p><b>Practical Experience</b></p> <ul style="list-style-type: none"> <li>• Experience of work environment</li> <li>• Experience of construction operations</li> </ul>	

## 6.2 Safety managers in practice

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*In this part of the chapter, interviews and observations are encapsulated in second order construct and thereafter supported with a first order construct of freely translated narratives and statements that confirms the observations, with increased indent.*

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### 6.2.1 Bridging the knowledge gap

In recent years, project teams have noticed an increase of pressure due to new legal provisions and changing regulations of safety. Along with the implementation of internal safety management guidelines and processes, the PBOs express that there is an information overload and an increased workload. The distance between the project professionals' communities and the safety professionals' communities in the human resource department is too long and their professional practices are unsynchronised.

Many ambitious safety management guidelines and processes have been developed in recent years but have led to an overload of information and routines for the project organisation (PM1-2). CM3 and CM4 stress that that the project management team is in need of support to deal with superseding provisions and constantly changing safety regulations, someone that possesses knowledge of which provision we have to implement. Altogether, initiatives and changing regulations take too much time for construction managers and production supervisors to handle; they are not capable of managing everything (PM2). PM1 also emphasised the difficulties they experience with the overload of safety initiatives and the insufficient collaboration and coordination between the work environment support in the human resource department and the project organisation.

Work environment engineers handle several projects simultaneously and are responsible to develop and implement safety guidelines and inform the PBO of new provisions. They spend a substantial amount of time at the office but are also needed on site to monitor performance and support the PBOs. They handle administrative and theoretical duties while the safety manager should be more of a hands-on operational extension on site. The safety manager is needed as a knowledge broker, to acknowledge safety awareness, educate the PBO on the directives of the work environment, develop routines to uphold a certain level of safety and reach conformity in the attitude towards safety. There is a risk that the safety manager becomes too administrative, which in turn would hinder the person to spread knowledge among project personnel. It follows that the safety manager must adapt the division of time between administrative support and on site support depending the competencies in the PBO and its need of support.

According to PM1, the work environment engineers should inform the project management staff with guidelines and provisions while the safety manager rather should take the role as spokesman to support the entire PBO, to ease implementation of provisions and educate personnel on the directive of the work environment engineer. Since knowledge vary within PBOs, it is important that the safety manager identify knowledge inadequacy and educate personnel so that everyone follows a certain standard and have sufficient awareness of safety (AMI). Both SM2 and SM3 recognised that especially young project management members were in need of their support due to limited experience. According to AMI, the safety manager is important to enhance the awareness of safety and someone that can contribute with his expertise to increase the standard of work preparations and the safety planning, which is confirmed by all production supervisors (PS1-5). One way of implementing new safety procedures is to show workers how to do it in practice; inductive learning (AMI). According to SR2, it was very helpful to have a safety manager on site that could explain how to perform some operations.

The safety manager's duties must be adapted with respect to the specific project and the support that the PBO is in need of. If the organisation already has a high safety standard on site, it follows that the safety manager instead should assist with administration (DM1). CM2 also expressed the importance of having a safety manager that can be an aid in administrative work, but must not get stuck in front of a computer, but most importantly the safety manager should be a support on site.

Thus, the narratives express the need of a knowledge broker to bridge the gap between the communities. Even though this seems to be a common perception, there does not yet, however, seem to exist a formulated practice for how this should be done. The cooperation between the safety managers and the rest of the safety support, including the work environment engineers, is limited. There does not seem to exist a common objective for which they strive for. During participation in a Safety Collaboration Meeting (SCM) it was observed that the work environment engineers should serve as mentors for the safety managers and help them with implementation of new procedures and methods. How this is supposed to be performed, however, was ambiguous. Moreover, several issues were discussed during the meeting, but no strategy for how to solve these issues were proposed. Identified problems were e.g. that some workers do not want to use personal protection equipment, some projects have problems with their identification procedures (iD06) and that difficulties occur when people speak different languages.

SM1 stated that he calls for a common objective among the safety managers and a better collaboration with the safety support in human resource department. He said that the participants in the SCM were at different levels in their discussions, it did not lead anywhere. SM1-3 all expressed that little or no cooperation between them and the safety support or the work environment engineers existed. However, SM2 emphasised that the SCMs and their roles are rather new and they are still trying to figure out how to develop their roles and their cooperation.

### 6.2.2 Negotiation and inclusion through employee support

It seems to be a common view that there are enough resources, equipment and appropriate procedures and methods available to achieve a safe and healthy work environment. However, people fail to execute operations safely anyways and accidents occur. Apart from implementing safe work methods, the PBOs also need to increase consciousness and alter their attitudes towards their work environment. In order to get to the next level and enhance the safety further, the culture in the PBOs and the workforces' behaviour must change.

CM3&4 states that a safety manager is a key role that should make the workforce strive for the same goals and set an example. There is also a need to unite workers on site with the management team (PS3). If everybody's behaviour and habits were in accordance with IFE and routines were established, then the safety manager would no longer be needed (SM1). There is joint responsibility for all project members to uphold a good level of safety (CM1 & SR1). SM2 work continuously with IFE in the project and try to address the psychosocial aspects and strive for inclusion. Many subcontractors and different business units from Skanska with different corporate cultures make the inclusion of all project members challenging (SM1&3).

The safety manager face many challenges, one of them, maybe the most important one, is the one of changing behaviour of individuals and make them aware of the risks they expose themselves to;

We need a change in the safety culture on our construction sites which is reached only by being present on the construction site. We need to change the behaviour of people and make them aware of risks they expose themselves and others to. We have all resources we need, but each individual must understand their influence on the safety, and that is where the safety manager faces an important challenge, both with employees of Skanska as well as subcontractors, and also the psychosocial aspects. (PM1)

Being someone that everyone can confide in and turn to no matter the issue, and no matter their community belonging, makes the safety manager's relationship to each project member most delicate. In this sense, the safety manager engages in an employee support role. The safety manager should therefore not be seen as anyone's manager when trying to facilitate inclusion and consciousness in and between communities, and trying to diminish the boundaries.

PM2 express that the safety manager should not be a police and correct people in their doings. The safety manager should also encourage a better psychological and social environment and strive for better inclusion among all disciplines. Furthermore, the safety manager should be a person that anyone can confide in that is not anyone's manager (DM1). It is important to remember that the safety manager is not responsible for construction tasks which put that person on another level, as a link between workers on site and the management staff (PM1). With my experiences as a worker, I know the importance to include everyone and to make sure that everyone feels that they contribute and that they have a belonging in the project (SM3).

### 6.2.3 Support through monitoring and controlling

The perception and expectation of how the safety managers should support the PBOs is rather divided. The district managers' and the projects managers' narratives of what a safety manager should do were mostly unified, but the production supervisors', the construction managers' and the safety representatives' narratives were more diverse. While most of the interviewees recognised the safety manager as a supportive advisor; to advise and assist the project team in the work of health and safety, some, on the other hand, expected the safety managers to also take over tasks and ease the workload for the management team.

PS3 explained that the safety manager to some extent relieved the workload of coordinating workers on site, but also taught him what to focus on and put pressure on him to always keep health and safety aspects in mind. Furthermore, PS4 & 5 regarded the safety manager as someone they could allocate some of their duties to and focus on their primary tasks, construction execution. CM1 expressed great relief of having a safety manager paying full attention to safety precautions with mandate to correct workers in their doings, to ensure that operations are executed safely. He further expresses that the safety manager has to act as a sort of police and nag about safety on site to ensure safe behaviour. SM1 narrated that he gladly helps the management team to relieve some of their workload, but he does not want to be a person that is supposed to correct and monitor workers in the production supervisors place. CM2 also manifested that the safety manager should not be a person that constantly monitor and correct others, rather offer suggestions and solutions. He explained that he is supposed to be the link between the workers and the management team, even if he belongs to the management team. SM3 said that he has to be harsh and sometimes firm to work



as a supervisor to ensure that people do as they should. SM2 stated that he has to be a nag sometimes but he emphasised the importance of good feedback and to always maintain good relationships with the workers.

There is a risk of having a safety manager engaged as a controlling and monitoring support to the PBO. Being the safety expert in the project team, some project members tend to rely on the safety manager to take on their duties and responsibilities. If duties are allocated to the safety manager, others might focus on other matters e.g. execution, and pay less attention to safety. However, the safety manager should not be someone that undertake others responsibilities. It is also important that the safety manager not only focuses on safety and work environment, but also the progress of the process and assist in execution operations.

The safety manager needs to keep an eye on workers, subcontractors and managers to address the importance of safety time to time (DM2). The overall risk is that the rest of the management pay less attention to safety (CM1; AMI; PM1). DM1 emphasised that the existing management team must not lean on the safety manager and expect that person to undertake their responsibilities concerning safety. The production managers', with their safety coordination responsibility stipulated by law (BAS U), and the work environment engineers have the general controlling function as managers, and that should not be transferred to a safety manager (PM1; AMI). It would only make the workers angry if the safety managers acted controlling and corrected people (SR1).

*“The safety manager must not be a secretary”.* (PM1)

#### 6.2.4 In pursuit of an identity and defining boundaries

From the narratives described above, there are different perceptions on how the safety managers should approach and support the PBOs. Being decoupled from the rest of the project members, even though they work with and within the project teams, complicates their position. They serve as a support professional, within HRM, but are employed in the projects or districts. Moreover, they are also employed as a part of the project management team while trying not to be the workers' managers. Thus, they embody a boundary role between communities in a complex set up and their identity is ambiguous. The issues that were identified during the SCM were, more or less, only stated and a discussion on how to solve the problems was absent. Many of the participants also seemed unfamiliar with the structure of the safety support organisation and the different functions. The appropriate title of the safety manager is safety advisor; the person is an advisor rather than a manager.

DM1 said that clear boundaries must be upheld, but the safety manager, however, cannot only think about safety, just like the production supervisors must still focus on the safety aspects. CM1 stated that the safety manager has the mandate to stop the execution of any task if he considers it being dangerous, but this has to be done carefully. The safety manager must have a deep understanding of the practice on a construction site and not intervene for every smallest detail. SM1-3 expressed that they are trying to form their new role and find an appropriate approach in the PBOs. There is a need of collaboration between safety managers and work environment engineer, to find a common objective and a way to coordinate between the divisions of Skanska, which does not exist today (SM2-3, AMI). SM1 expressed his frustration at the safety managers' lack of a common objective and at the insufficient cooperation with the work environment engineers and the rest of the safety support.

*“It feels as if I am in some outer space and barely know what to do, and at the same time trying to include everyone and make them welcome.” (SM1)*

*“The title “safety manager” is not appropriate, it comes from the English version and a role that possess legal authority and responsibilities which is something I do not have.” (SM3)*

## 7 Discussion

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*This chapter presents an analysis of the empirical findings and the literature study in relation to the theoretical concepts of human resource management, communities of practice and boundary spanning.*

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### 7.1 The interplay of communities - understanding the social aspects

This study has made it clear that the safety support in the human resource department and the PBOs are two unsynchronised communities of practice. They seem disconnected both concerning their practice, their view of meaning and geographically. It is easy to understand that a risk for misunderstanding arises when these communities are supposed to cooperate and perform boundary processes (Wenger 2000). Moreover, the project organisations comprise several communities within the community, due to their fragmented and transient nature (Khuzaimah and Hassan 2012); management team, workers and subcontractors (professionals and consultants from the design phase etc. excluded). The complexity of this inter- and intra-functional work system (Bredin and Söderlund 2006) complicates the boundary spanning processes even more, and requires careful management concerning both the “intraplay” in the PBOs and the interplay between the PBOs and the human resource department.

The vision of the safety manager's role and the job description states that the safety manager should be a link between the project management and the workers on site, as well as a link between the safety support department and the whole project organisation. The only way to link these communities together is probably via socialisation (Nonaka et al. 2000), since the community of practice approach tells us the importance of the social aspect in the learning process (Lave and Wenger 1991), and since the construction industry is characterised by a high level of tacit knowledge (Nonaka and Takeuchi 1995; Khuzaimah and Hassan 2012). The difficulties in sharing knowledge in PBOs (Evans and Scarbrough 2014) and the fact that most innovation occurs at the boundaries between domains (Carlile 2004) leave the safety managers with a profound challenge. The narrated ambiguity of the safety managers' position in the organisation and the divided perceptions of their assignments are likely to weaken their ability to perform. Moreover, it is important to emphasise the fact that the role of safety manager's is relatively new and that the interviewed safety managers have had other positions within the same company before, which further complicates their peripheral identities and their boundary spanning trajectory related to the communities of practice (Wenger 1998).

Holt (2005) argues that control of workers and their behaviour is difficult. The focus should instead be on training and develop skills to identify and comply with safe work methods. He further states that the social environment of the workplace must encourage good conditions and practices and that the attitudes amongst employees need constant improvement to foster a good safety climate. Lingard and Rowlinson (2005) also emphasise the importance of cultural and motivational aspects and Sunindijo and Zou (2015) states that safety management and

organisational integration go hand- in- hand. Thus, this provides insights to how a safety manager should approach the PBOs as a boundary role.

## 7.2 Safety manager as knowledge broker

Bredin and Söderlund (2006) identified key roles of HRM to deal with organisational complications that arise in the complex setting of PBOs. The safety manager may take the role as a knowledge broker and an individual coach. Taking the role as a knowledge broker, involve the safety manager in boundary spanning activities which, according to Wenger (2000) is a process of delicate work that requires careful management. It emphasise the importance of collaboration and coordination of the involved actors to increase organisational effectiveness and thus enhance the company's competitive advantage (Barney 1991). A strengthened connection and improved coordination between the safety managers and the work environment engineers would thus improve the organisational capital, leading to an increased effectiveness of knowledge brokering between the communities and growth of human capital.

The safety manager's position as a boundary role is essential for the organisation's performance by virtue of communicating information (Tushman and Scanlan 1981). In the PBO the safety manager should take the role as an information processor to filter and facilitate information to ease the workload by resolving information overload and make sense of the information (Aldrich and Herker 1977). At the same time, the safety manager serves as an external representative of the HR department in the PBO, to transmit information and broke knowledge. Thus, in simple terms, making the safety manager more or less a communicator between these communities. Since the narratives made it clear that collaboration between these communities is vague, the bridging of competencies is made very difficult. It was also observed that the safety manager's do not seem to be legitimate participants of the HR community of practice, which, according to Lave and Wenger (1991) and Levina and Vaast (2005) is essential for bridging competences between communities. Furthermore, a better cooperation between the safety managers and the human resource department would probably increase understanding between PBOs and the HR department and give the safety managers momentum as a specialist, which in turn could provide them with a clearer identity and belonging.

Apart from communicating information and knowledge between communities of practice, factors such as corporate culture, collective values, safety competence, training and the ability to manage knowledge is vital for the PBO (Hallowell 2012; Lingard and Rowlinson 2005). Lingard and Rowlinson (2005) as well as Bahn and Barratt-Pugh (2012) argue that induction training is needed to uphold a satisfactory health and safety performance and to enhance the organisational safety culture. It follows that the safety manager, in addition of being communicator, has to perform individual coaching to ensure that employees assimilate the transmitted information by induction training. This assumption further implies the importance

of the safety manager being an extension of the HR department in the PBO.

The integration of a safety specialist on project level creates conditions for exploration of new safety methods and effective exploitation of good practice (Eriksson 2013). As a knowledge broker, the safety manager should thus work as a “double-sided” boundary spanner and continuously report to the work environment engineers about effective and non-effective safety methods, which ultimately enhance the safety department's understanding of the PBOs. In other words, they take on a blurring boundary spanning role in the PBOs and a bridging boundary spanning role directed back to the HR department (Evans and Scarbrough 2014).

### 7.3 Safety manager as an employee support

Words may lack continuity of meaning across boundaries between social systems and communities (Wenger 2000), thus the safety manager must be more than a communicator between communities of practice. It was observed that the safety manager took different professional roles depending on the project's setting and the support needed by the PBO - as a support and a knowledge broker or a monitoring and controlling actor. According to Holt (2005) and some respondents, there is a need to foster a culture that motivates and involves all members of the organisation to reach the next level of safety. As a support of the HRM, the safety manager may take on the role as an employee support and an individual coach (Turner et al. 2008; Bredin and Söderlund 2006), to contribute to a better culture.

It follows that Skanska implemented the educational program IFE to change employees' attitude to safety and thus change the safety culture of the organisation. However, drawing on Marker (2010) there is a need to interact with employees in their social context to unravel basic underlying assumptions, since this measure has the greatest impact on the organisational culture (Schien 1985; Wiewiora et al. 2013). The above discussion on social aspects of learning and induction training should apply to cultural changes as well. Thus, making the educational program insufficient to change human behaviour on its own. Kletz (1985, in Lingard and Rowlinson 2005) confirms this by the formulation that a paper system with policy statements is insufficient, because it is vital to win the “hearts and minds” of the workers. Since the safety manager is supposed to take the role as supportive actor, rather than as a monitoring and controlling manager, he has the ability to influence individual behaviour in their social context without prestige and status inflicting and thus act as a change agent. It might be that the only way to ensure that all project members act according to IFE is by having a safety manager interacting with employees in their social context, on a daily basis, to spread knowledge and to enhance a unanimous safety culture in the PBO. This was also described by some respondents as the most important factor to foster a good safety culture.

## 7.4 Delimiting boundaries

While studying the safety managers and their relation to the PBOs and the HR department, one word is more central than any other: ambiguity. The project teams' narratives indicated that their connection to the safety support department is weak and that they get overwhelmed with duties and initiatives, while not being supported with implementation. The organisational chart, presented in Chapter 5 – Skanska AB, and the fact that many new methods and initiatives occur, proves that a rigorous and ambitious safety support in the HR department exist. Thus, there should be enough resources to achieve a good safety culture and transmit information and knowledge without adding more safety support personnel. However, the safety support function does apparently not perform satisfactorily and it seems as if the safety managers have been employed in an eager to solve the problem of cooperation. Hence, the safety managers' assignments and boundaries should be limited to do just that.

The role of the safety manager possesses a great potential to contribute as a boundary spanner and an agent to change the safety culture. However, their responsibilities and accountabilities in relation to other professionals should be made clearer if this potential is going to be fully realised (Pousette and Törner 2009). It was observed that the safety managers requested clarity of the role in order to find an identity in the PBO. As of now, the safety managers had different identities; some were employed to handle administrative work while others conformed to the role as a boundary spanner. It is not a problem itself that a safety manager relieves the management team of their workload by taking on some of their duties. This must, however, be done carefully, since it poses a risk to intervene with the purpose of their main objectives, and a risk to weaken the division of responsibilities between professionals that could be counterproductive (Pousette and Törner 2009) and thus inflict on the PBOs efficiency (Clark and Collin 2003).

The safety managers' roles are in a developing phase with undefined practices, which weakens them. Being both a boundary spanner and an employee support makes the safety manager an intermediary, filling organisational gaps between the PBOs and the HR department. Acting as a new role, employed in the projects or districts, they challenge traditional practice and communities by altering routines and structures. Therefore, they possess a liminality role while acting as intermediators, which means that they are in an organisational change process, between communities and in a vague formal belonging, regarding both position and space (Karrbom Gustavsson 2016).

## 8 Conclusion and recommendations

Since the safety support in the human resource department and the project organisations are two unsynchronised communities of practice, there is a need to develop a closer collaboration and coordination between these communities. The Safety Collaboration Meetings is platform that serves a great opportunity for collaboration and increased understanding of the communities. The work environment engineers should be responsible for teaching and educating the safety managers and the safety managers, in turn, should process that information and make sure that each member of the PBOs has the right competence for their assignments. The safety managers and the work environment engineers should have close cooperation with each other and be close professional partners in order to transfer knowledge between the HR department and the PBO.

The vast safety support organisation and its many roles have, in some extent, led to misconceptions of its function and how it serves the PBOs. Furthermore, the fact that some interviews were very short shows that the respondent had little interest of the subject which is an interesting findings itself. It follows that all employees need to be enlightened on how safety is managed at Skanska, what roles there are in the organisation, what they do and whom to turn to for help, in order to avoid organisational ambiguity and enhance and increased interest for safety. Clear responsibilities and a uniform approach should make it easier for subcontractors to comply with Skanska's standards and methods.

The vision of employing a safety manager is unanimous, and the role description states what the safety manager should achieve. However, there is need to define how the safety manager should achieve the objectives by practical means. The safety managers need to be legitimate participants of the HR department for their competence and identity to be acknowledged in the different communities. To realise the potential of the safety manager as a boundary spanner, a clear identity and division of responsibilities is vital. The safety managers' bridging approach towards the HR department and the blurring approach towards PBOs make it possible for effective boundary spanning and safety knowledge sharing between communities. Moreover, taking on the role as an employee support and an extension of the HR department in the PBO facilitates behavioural and cultural change that could foster a safer climate on worksites.

Successful employment of a safety manager will contribute to a better integration of professionals within and between communities, which in turn leads to better organisational integration. As a boundary spanner and an employee support interacting in the social contexts of the PBO, the safety manager possesses an opportunity to change behaviour which is necessary to achieve a higher safety level and probably lead to a more socially sustainable work environment. Furthermore, we have learnt that successful accident prevention improves business performance. The employment of new professions is a costly strategy and poses a risk to create an even more ambiguous organisation. It feels as if the safety manager is

supposed to glue the fragmented organisation together. It might be a successful solution, but it might also make the safety management even more ambiguous. The present focus should be on cooperation and exploitation of the existing resources and knowledge to achieve economic sustainability. Conclusively, based on the observed findings, the safety manager should not be regarded as a manager but rather as an advisor, and thus be given the title safety advisor.

## 8.1 Research questions

### **What are the objectives of employing a safety manager?**

The safety manager should be a link between the safety support and the PBOs to assimilate information and knowledge to improve safety management within the organisation. Moreover, they should foster a sound safety climate by implementing IFE and ultimately change the attitude and behaviour of employees and on site workers.

### **What are the safety manager's responsibilities and what should they be in order to achieve the objectives?**

The responsibilities of the safety manager are quite clearly stated in the role description (see Chapter 6). However, the perceived responsibilities in the projects are ambiguous in relation to others, and there is a lack of information on how the safety managers should work and comply with their responsibilities and reach the objectives. This hinders them to reach their full potential.

### **How is the safety manager perceived and how should they support the project based organisations?**

The safety managers are perceived differently among project members. Some consider the safety manager as an employee support an agent to change culture and behaviour. Others consider the role as a monitoring and controlling person that eases the workload of project members. In order to achieve the objectives, they should not engage in controlling activities, rather be considered as employee supporters and knowledge brokers.



## **9 Future research**

The importance of the cultural aspects of safety management and the difficulties in sharing knowledge in the PBO industry is well established. Future studies within the fields are nevertheless important, since the industry still struggles with these topics. The limitations of this study make it difficult to reach any industry wide conclusions on having a safety manager as a boundary spanner and employee support. Therefore, further research on safety and HR boundary roles is encouraged.

Future research could also further examine subcontractors' and on site workers' opinion on the employment of a safety manager and how the safety managers should support them. It would also be interesting to examine how IT tools may be used in safety management, to control, identify hazards proactively and standardise operational activities to improve safety on site. Studies could also focus on the safety manager's role in the design phase and safety management strategies to identify potential hazards in early stages of construction projects.

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# 11 Appendix

## 11.1 Appendix A - Open ended questions

### Intervjufrågor

**Fråga 1:** Berätta om din roll och ditt ansvar med avseende på arbetsmiljö och säkerhet?

**Fråga 2:** Vilka är dina erfarenheter i branschen?

**Fråga 3:** Kan du berätta lite om säkerhetsarbetet på Skanska? Hur har det utvecklats de senaste åren? Hur ser du på den utvecklingen?

**Fråga 4:** Kan du beskriva den nya rollen safety manager? (dess syfte, kvalifikationer, ansvarsområden) Möjligheter/utmaningar?

**Fråga 5:** Hur förhåller sig rollerna safety manager, arbetsmiljöingenjör och Bas U till varandra?

**Fråga 6:** Vilka effekter (positivt och negativt) har införandet av en safety manager gett så här långt?

**Fråga 7:** Har införandet av safety manager påverkat dina arbetsuppgifter? Arbetslagets uppgifter?

**Fråga 8:** Är det något som du vill lägga till?





## **Translation of survey questions:**

1. I believe that the safety has improved with a safety manager
2. Work operations are better planned with a safety manager and minimise risk of accident
3. I consider that the employment of a safety manager contributes to Skanska's attractiveness as an employer
4. I believe that the safety manager contribute to a better work relation between workers and managers
5. I believe that the safety manager notice me and encourage me to share my opinions about the work environment
6. The safety manager encourage me to take on a bigger responsibility for my own and others safety
7. The safety manager contribute with an increased collaboration between workers and subcontractors regarding safety of the work site
8. The safety manager's assignments are meaningful

## 11.3 Appendix C - Results from survey

The survey comprises 11 questions. The initial three questions are asked the respondents to secure that the person has some understanding and has worked with a safety manager in some sense. The results of these questions are presented in table 1 and 2. Moreover, the survey was conducted by 11 respondents of the “management team” and 15 respondents that were either team leaders of subcontractors, and workers. The results between the two target groups are presented in table 3 respectively 4. Thereafter follows a combination of results of questions 4 - 11 of both target groups.

**Table 1:** Findings from questions 1-3, management team

Question	1. I believe that the safety has improved with a safety manager	2. Work operations are better planned with a safety manager to minimise risk	3. I consider that the employment of a safety manager contributes to Skanska's attractiveness as an employer
Yes	11	11	11
No	0	0	0

**Table 2:** Findings from questions 1-3, subcontractors and workers

Question	1. I believe that the safety has improved with a safety manager	2. Work operations are better planned with a safety manager to minimise risk	3. I consider that the employment of a safety manager contributes to Skanska's attractiveness as an employer
Yes	14	14	14
No	0	0	1

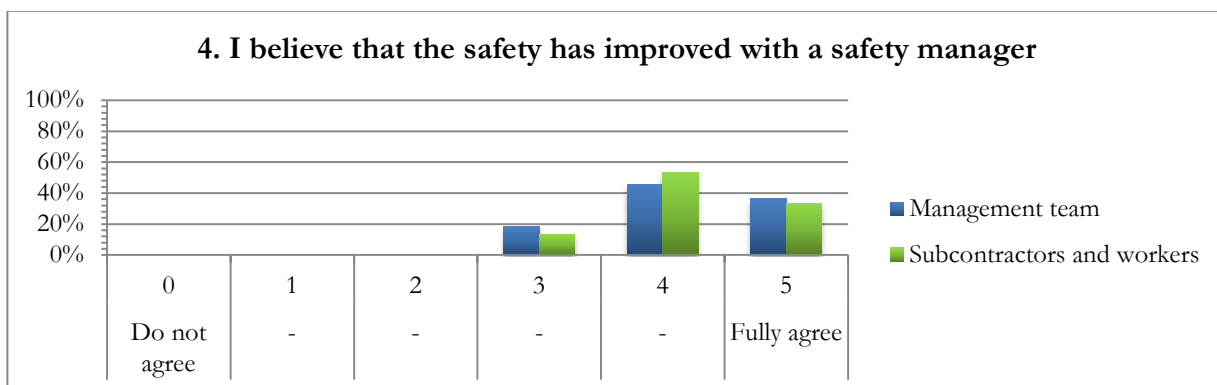
**Table 3:** Obtained results from target group ‘management team’.

Questions	Do not agree	-	-	-	-	Fully agree
	0	1	2	3	4	5
4. I believe that the safety has improved with a safety manager	0	0	0	2	5	4
5. Work operations are better planned with a safety manager and minimise risk of accident	0	0	0	2	6	3
6. I consider that the employment of a safety manager contributes to Skanska's attractiveness as an employer	0	0	0	2	4	5
7. I believe that the safety manager contribute to a better work relation between workers and managers	0	0	0	3	3	4
8. I believe that the safety manager notice me and encourage me to share my opinions about the work environment	0	0	0	3	3	4
9. The safety manager encourage me to take on a bigger responsibility for my own and others safety	0	0	0	1	6	3
10. The safety manager contribute with an increased collaboration between workers and subcontractors regarding safety of the work site	0	0	0	3	3	5
11. The safety manager's assignments are meaningful	0	0	0	1	3	7

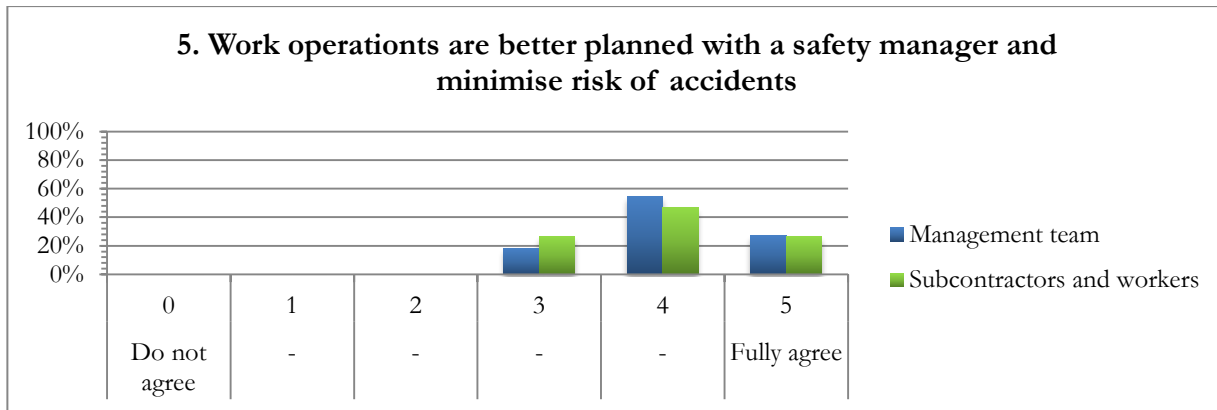
**Table 4:** Obtained results from target group ‘subcontractors and workers’.

Questions	Do not agree	-	-	-	-	Fully agree
	0	1	2	3	4	5
4. I believe that the safety has improved with a safety manager	0	0	0	2	8	5
5. Work operations are better planned with a safety manager and minimise risk of accident	0	0	0	4	7	4
6. I consider that the employment of a safety manager contributes to Skanska's attractiveness as an employer	0	0	0	1	5	9
7. I believe that the safety manager contribute to a better work relation between workers and managers	0	0	0	2	6	7
8. I believe that the safety manager notice me and encourage me to share my opinions about the work environment	0	0	0	2	2	11
9. The safety manager encourage me to take on a bigger responsibility for my own and others safety	0	0	0	1	7	7
10. The safety manager contribute with an increased collaboration between workers and subcontractors regarding safety of the work site	0	0	0	2	4	9
11. The safety manager's assignments are meaningful	0	0	0	2	3	10

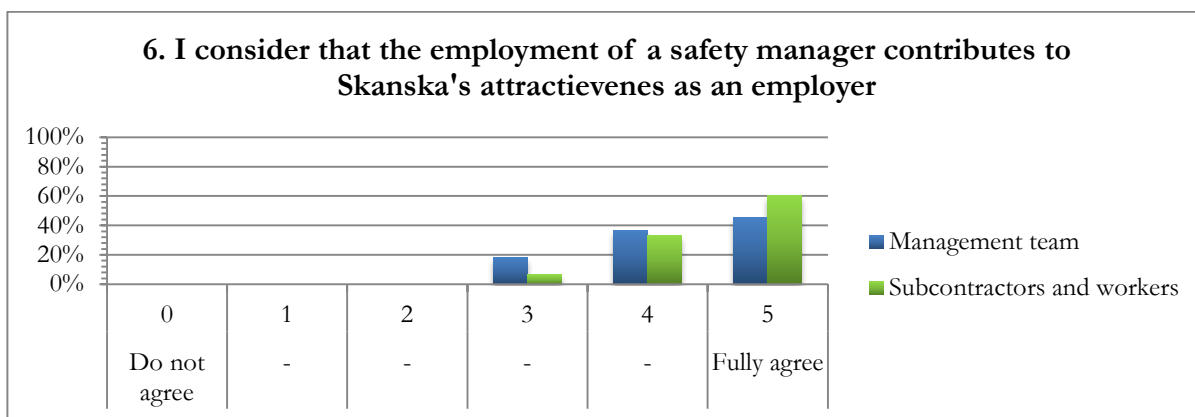
In the following section, the presented bar charts show the response frequency in percentage which is calculated from the above presented data. The blue bars represents response frequency of target group ‘management team’ and the green bars represent ‘subcontractors and workers’.



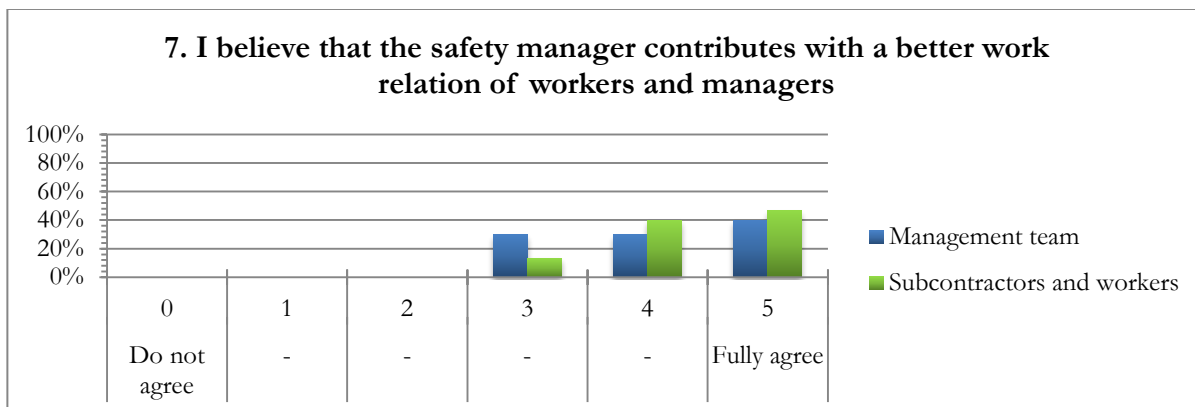
**Figure 1:** Response frequency in question 4, of both target groups.



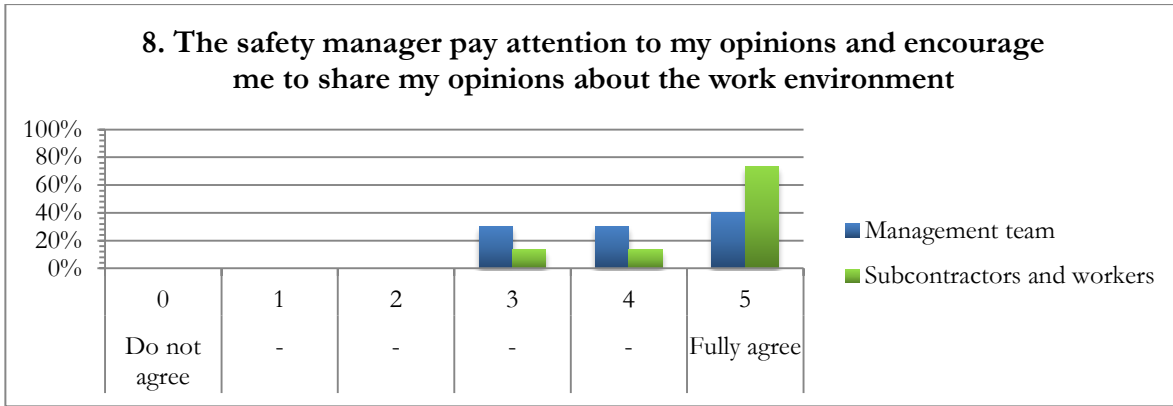
**Figure 2:** Response frequency in question 5, of both target groups.



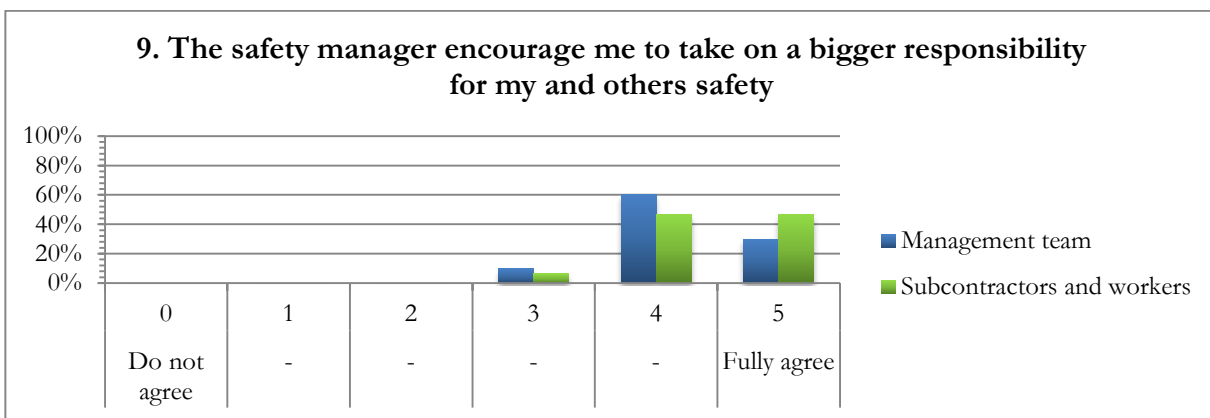
**Figure 3:** Response frequency in question 6, of both target groups.



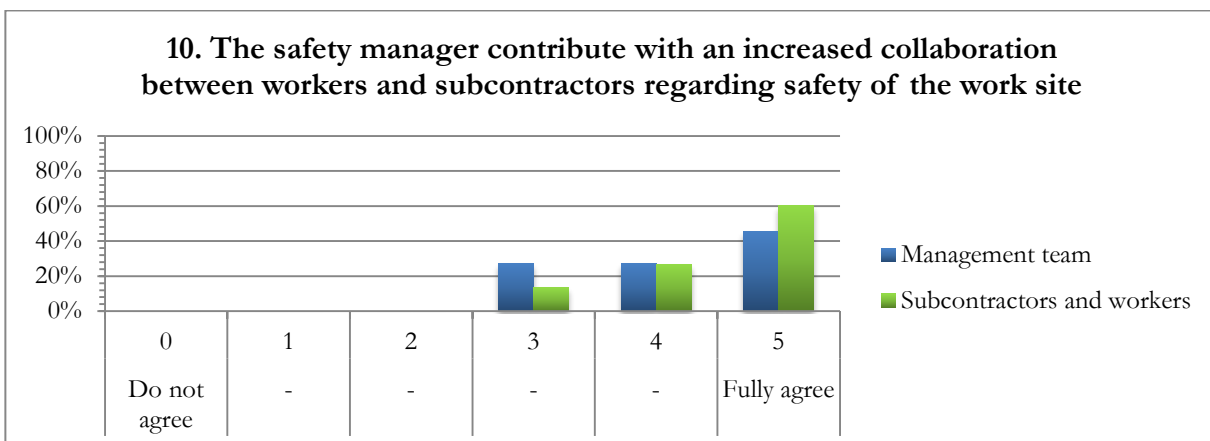
**Figure 4:** Response frequency in question 7, of both target groups.



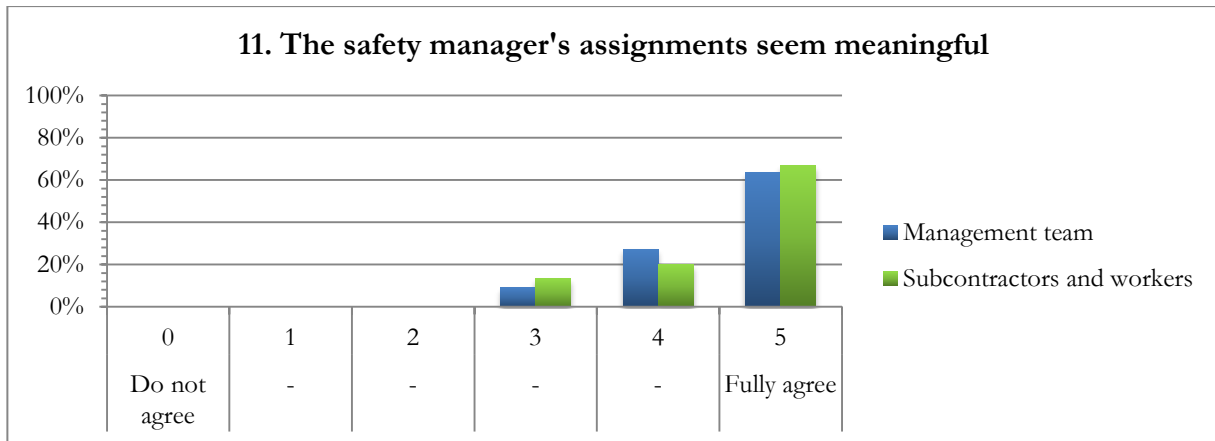
**Figure 5:** Response frequency in question 8, of both target groups.



**Figure 6:** Response frequency in question 9, of both target groups.



**Figure 7:** Response frequency in question 10, of both target groups.



**Figure 8:** Response frequency in question 11, of both target groups.

TRITA-FOB-PrK-MASTER-2017:45

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