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Factors Influencing the Unification of Safety Culture Within Construction Projects

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

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ABSTRACT

The construction industry has the highest share of fatal workplace accidents and incidents in Sweden, despite the high implementation of laws and regulations regarding safety. Main contractors have the responsibility to make sure that they are providing a safe work environment for the people employed at their construction sites. An important tool to achieve this in the fragmented construction industry, is by having a strong and unified safety culture throughout the project, which consists of attitudes, values, and behaviours towards safety. However, despite the efforts from main contractors to create a strong safety culture that are unified throughout the whole organisation, there are always people that are either not willing, or able, to adapt. This study examines this problem further by investigating how main contractors can facilitate a unified safety culture in construction projects.

A case interview study with observations and interviewees from five different construction sites of a major Swedish main contractor was conducted. The interviewees were employed in different organisational levels in building construction projects in Gothenburg and the organisational levels consisted of subcontractors, foremen, site managers and senior executives.

The study presents seven predominant factors that enables the main contractor to influence the subcontractors to adapt to their safety culture. These are: *Encourage positive communication, Knowledge Sharing, Increased Engagement from Site Management, Language Barriers, Job Satisfaction, Procurement, and long-term relationships with subcontractors*. The factors can be investigated further for organisations that wants to increase the unification of the safety culture in construction projects, and the study also mentions several possible enablers to unlock the potential of the discovered factors.

Key words: Safety Culture in Construction, Accident Prevention, Safety Performance, Project Management, Shared Mental Models, Unified Safety Culture

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Introduction

This chapter describes the background, aim and research questions for the thesis. The background gives a brief introduction to the current state of the construction industry regarding safety and accidents, while the problem analysis serves to highlight challenges and guide the reader towards the area of research. The aim and research questions specify the issue under investigation.

1.1 Background

According to the Swedish Work Environment Authority (2020a) the construction industry is one of the worst affected industries regarding work injuries and fatal accidents in Sweden. Despite the implementation of laws and regulations, aiming to improve the safety in construction projects, the industry still ends up in the upper range when comparing the frequency of fatal work-related accidents to other industries, with a share of approximately 23% (Swedish Work Environment Authority, 2021a). The number of fatal workplace accidents per 100 000 employed in Sweden is approximately 1,7, which still puts Sweden close to the top of having the lowest number of fatal accidents per 100 000 employees, with a similar proportion of accidents in the construction industry (Statista, 2018). Indicating that the construction industry is an important factor for lowering the overall number of fatal accidents in Europe as a whole.

The construction industry is characterized by hard physical work, tight time schedules and pressured budget, which in turn makes it more prone to accidents than most industries. Research has shown that there are close links between a high number of accidents and poor safety culture (Prussia, Brown & Willis, 2003). A poor safety culture is characterised by poor values, behaviours, and attitudes towards safety (Guldenmund, 2000). Prussia et al. (2003) showed that workplaces with poor safety cultures led to blame-casting and disagreement between managers and workers regarding accident causation. Which further translates into poor accident and incident assessment, and furthermore an overall unproductive approach to safety.

Regardless of the exertions being made to improve the safety, safety culture is proven to be the most decisive factor in what the effect of these efforts will be (Kecklund, Arvidsson & Lindvall, 2014). Even though efforts to improve the safety culture has been done, according to a safety-survey conducted by the industry association “Byggcheferna”, reaching the goals of a well-functioning safety culture are far from being achieved as long as people are still being injured or dies at work, regardless of the efforts performed (Byggcheferna, 2019). Which is in-line with the Swedish Work Environment Authority’s (2021b) zero-accident vision. Furthermore, cultures consist of perceptions, values, attitudes, and behaviours of individuals; hence these factors are the ones that need to be changed, developed, and improved in order to be successful in improving the safety culture (Guldenmund, 2000; Naevestad, 2010; among others). Other aspects that also may contribute to deficient safety culture are, safety lacking in

status and priority which weakens the safety culture, hence eradicating work accidents becomes difficult

1.2 Problem Analysis

The wide extent of accidents occurring in the construction industry has made safety a hot topic in the industry over the last years and efforts are continuously being made in order to decrease accident rates (JM, 2022; PEAB, 2022; Skanska, 2022; NCC, 2022). Even though improvements have been made, reports from The Swedish Work Environment Authority (2021b) proves that the industry still has a long way to go before meeting the zero-accidents vision. Multiple researchers agrees that the characteristics of the industry with fragmented projects with tight deadlines and financial pressures, plays a major role in construction companies' ability to control and adapt towards more safe working procedures (Blismas & Lingard, 2006; Halse, Kines & Andersen, 2009; Dejoy, 2005).

As a way to cope with the fragmentated construction projects and increase the safety in organisations, many researchers are stressing the importance of a strong safety culture to decrease accident rates (Blismas & Lingard, 2006; Prussia, Brown & Willis, 2003). A strong safety culture is characterised by a unification of attitudes, values and actions that encourages safety, but this can be very hard to achieve with multiple actors and individuals involved in each project (Prussia et al., 2003). The reason for this is that different actors and individuals often have their own set of values, attitudes, and actions that they carry into every new project, which stimulates the creation of groups within the project (Baarts, 2009). These groups tend to create their own sub-cultures with their own views of safety, making it hard for management to control the general safety culture in the project (Blismas & Lingard, 2006; Prussia et al., 2003; Dejoy, 2005).

Researchers also points towards the role of managers at different levels in the organisation for establishing a healthy safety culture. Senior managers have the responsibility for setting safety policies, strategic objectives for safety and allocating resources towards safety efforts, while middle managers, first-level managers and supervisors play a key role to pass on these directives throughout the organisation (Blismas & Lingard, 2006). However, a continuous problem in the industry is to establish the safety culture among the subcontractors in construction projects (Prussia, Brown & Willis, 2003; Baarts, 2009; Guldenmund, 2000; among others). Thus, it is interesting to study the safety culture to see whether there are different factors that might impact the overall safety culture compliance and how to better include the subcontractors in the general safety culture in Swedish construction projects.

Previous research has primarily focused on safety cultures in different construction projects performed by different main contractors, and the effects of safety cultures on different construction sites with the same main contractor are not as comprehensively investigated. By studying the safety culture on different construction sites with the same

main contractor it is possible to capture factors affecting the safety culture other than the centrally decided safety culture, as each project have the same guidelines and ways to work with safety provided by the central unit of the main contractor. For example, when studying construction sites with different main contractors, a high degree of the differences in safety culture can be explained by the different cultures of the main contractors. However, when studying different projects with the same main contractor, other factors such as the differences in the characteristics of each project will become more visible.

1.3 Aim

The aim of the thesis is to investigate how to create a strong safety culture in construction projects. The thesis will focus on the unification perspective, where a strong safety culture is characterized by unified views on safety-related behaviours, values, and attitudes. A unification of the perceptions of safety culture is particularly challenging to achieve due to the fragmentation and high number of subcontractors involved each project. Hence, the study aims to examine the following main research question:

- Where should main contractors focus their efforts in order to create a unified safety culture in construction projects?

To answer the main research question, the following explanatory research questions have to be answered:

- How does the perceptions of safety culture differ throughout the case organisation?
- What factors are predominant in deciding the level of unification of the safety culture?

1.4 Limitations

This master thesis focuses explicitly on the Swedish construction industry and building construction projects. Hence, the foreign construction industries and other areas in construction, such as infrastructure projects will not be considered. This limitation was mainly included for convenience, as the authors are located in Gothenburg. However, the subject also required that certain organisational infrastructure is in place and a close collaboration between main contractors and subcontractors that is present in Swedish construction sites. This makes it easier to isolate the area of investigation from other problems that might affect the study, such as insufficient room for interaction between different project levels or an overall disregard of safety in the organisation.

The study will not assess the overall values, attitudes, and behaviours of the case organisation, but will rather focus on the perceptions of different safety elements and

whether the perceptions of the culture are unified or not throughout the organisation. This means that the study assumes that the overall safety culture communicated by the main contractor good, and that no further analysis on the overall values, attitudes and behaviours are made. However, the study makes use of the safety culture on individual level to find discrepancies between different organisational levels, but the focus is still on the discrepancies and how homogenous the safety culture is, rather than the values, attitudes and behaviours forming the culture.

1.5 Ethics and Sustainability

In the UN's global goals, the importance of human rights and a reasonable work environment are stated (UN, 2021). Further, The Swedish Work Environment Authority Safety describes the Work Environment Act where the prevention of health issues and accidents at work are described (The Swedish Work Environment Authority, 2020). Hence, safety can be closely connected to the UN goals and Work Environment Act as a central factor of importance. The safety of employees should always be prioritized, and everyone should be able to leave their work in the same condition as they came. The safety of the employees is also a question about ethics, where human rights and the value of employees are topics to discuss. Work environment and health of the employees should also be considered as important factors in social sustainability. Prosperous employees contribute to the company's competitiveness and development. Hence, this thesis addresses the importance of safety and will provide possible areas of improvements to develop the safety in construction projects further.

2 Theory

This chapter presents previous research within the area of safety culture. The chapter begins with defining safety culture and further describes the importance of a strong and unified safety culture. Furthermore, factors affecting the safety culture in construction projects and areas of possible improvements are presented.

2.1 Safety Culture

Safety culture is throughout the literature described as a central element in order to create a safe construction environment and multiple studies have been conducted that proves the importance of the safety culture on the proactive cover against accidents (Nævestad, 2010; Hudson, 2007; Rundmo & Hale, 2003; Prussia et al., 2003; Kecklund et al., 2014). The safety culture is formed by common understandings, attitudes, values, and norms that exists for individuals, groups and organizations as a whole, which is deciding how tasks are carried out, how risks are considered and how to prioritize regarding e.g., time, money or safety (Nævestad, 2010; Hudson, 2007; Kecklund et al., 2014).

The expressions “safety culture” and “safety climate” are frequently encountered in previous research, which seemed to be referring to the same area of concept, creating confusion. Guldenmund (2000) performed a research report aiming to distinguish safety culture and safety climate by investigating and evaluating the existing literature. Guldenmund (2000) also states that, throughout the literature, the terms have been ambiguous and that the relationship between them is unclear. However, Guldenmund (2000) then reflects and discusses that safety climate should be considered to rely on espoused values, which also can be described as attitudes. Whereas safety culture is assumed to be the cause of the safety climate, consisting of three levels – *The core, middle layer, and the outermost layer*. The core is argued to consist of basic assumptions, both unconscious and conscious, they permeate the entire organization. The middle layer consists of attitudes, or as named in the definition of safety climate, espoused values. Lastly, the outermost layer is assumed to consist of manifestations connected to, in the subject of this study, safety. Regarding safety, examples could be safety rounds, posters addressing the safety rules, wearing, or not wearing personal protective equipment near misses and accidents (Guldenmund, 2000).

Thereafter, Guldenmund (2000) argues that safety climate should be used as an alternative safety performance indicator, whereas the safety culture contributes with an understanding of values, attitudes and behaviors impact on safety. Hence, it yields the substrate for safety improvements (Guldenmund, 2000). Throughout this report, the term ‘safety culture’ is chosen to be used, due to the impact of psychological aspects, such as behaviour, attitudes, values and perceptions, on safety being chosen to investigate and evaluate.

2.2 Safety Culture Maturity Model

The idea of developing maturity models to help companies to define their current level of maturity, within a specific topic of interest, and to contribute with guidelines of activities necessary to reach the next level of maturity, was at first used in the software industry by the Software Engineering Institute (SEI) (Fleming, 2001). The model created consisted of five levels measuring the company's maturity level within their practices and processes such as capability and efficiency.

The concept of the Safety Culture Maturity Model (SCMM) was first introduced by Fleming (2001). The model was originally intended to be used to assess the safety culture in the offshore oil and gas industry (Fleming, 2001), but has since been adapted and applied to multiple other industries, such as the medical sector, manufacturing, and construction. Fleming identifies ten key elements that are highly relevant and important to consider in an organization's safety maturity model. The maturity of the organization is then evaluated and determined regarding the following ten elements (Fleming, 2001):

- *Management commitment and visibility*
- *Communication*
- *Productivity versus safety*
- *Learning organization*
- *Safety resources*
- *Participation*
- *Shared perceptions about safety*
- *Trust*
- *Industrial relations and job satisfaction*
- *Training*

Thus, Fleming developed the SCMM as a maturity model concerning safety with five levels of maturity described further below. Fleming also points out the importance of having the right approach and cause when attempting to use the SCMM to develop the safety within an organization. Improvement of safety should not be driven by avoidance of accidents that may lead to prosecution or other unfavourable situations, it should be driven by the desire to prevent accidents, injuries, and fatal accidents, for the benefit of the individual (Fleming, 2001).

The five levels of maturity in Dr. Fleming's SCMM (2001) are described accordingly as:

Level 1: Emerging

“Safety is defined in terms of technical and procedural solutions and compliance with regulations. Safety is not seen as a key business risk and the safety department is perceived to have primary responsibility for safety. Many accidents are seen as

unavoidable and as part of the job. Most frontline staff are uninterested in safety and may only use safety as the basis for other arguments, such as changes in shift systems”.

Level 2: Managing

“The organization’s accident rate is average for its industrial sector, but they tend to have more serious accidents than average. Safety is seen as a business risk and management time and effort is put into accident prevention. Safety is solely defined in terms of adherence to rules and procedures and engineering controls. Accidents are seen as preventable. Managers perceive that the majority of accidents are solely caused by the unsafe behaviour of front-line staff. Safety performance is measured in terms of lagging indicators such as LTI and safety incentives are based on reduced LTI rates. Senior managers are reactive in their involvement in health and safety (i.e., they use punishment when accident rates increase)”.

Level 3: Involving

“Accident rates are relatively low, but they have reached a plateau. The organization is convinced that the involvement of the frontline employee in health and safety is critical if future improvements are going to be achieved. Managers recognize that a wide range of factors cause accidents, and the root causes often originate from management decisions. A significant proportion of frontline employees are willing to work with management to improve health and safety. The majority of staff accept personal responsibility for their own health and safety. Safety performance is actively monitored, and the data is used effectively”.

Level 4: Cooperating

“The majority of staff in the organization are convinced that health and safety is important from both a moral and economic point of view. Managers and frontline staff recognize that a wide range of factors cause accidents, and the root causes are likely to come back to management decisions. Frontline staff accept personal responsibility for their own and others health and safety. The importance of all employees feeling valued and treated fairly is recognized. The organization puts significant effort into proactive measures to prevent accidents. Safety performance is actively monitored using all data available. Non-work accidents are also monitored, and a healthy lifestyle is promoted”.

Level 5: Continuous improving

“The prevention of all injuries or harm to employees (both at work and at home) is a core company value. The organization has had a sustained period (years) without a recordable accident or high potential incident, but there is no feeling of complacency. They live with the paranoia that their next accident is just around the corner. The organization uses a range of indicators to monitor performance, but it is not performance-driven, as it has confidence in its safety processes. The organization is constantly striving to be better and find better ways of improving hazard control mechanisms. All employees share the belief that health and safety is a critical aspect of

their job and accept that the prevention of non-work injuries is important. The company invests considerable effort in promoting health and safety at home”.

However, Flemings SCMM were not adapted to the construction industry, hence several studies have been conducted in order to adapt the SCMM model to the construction industry. McGeorge (2011) states that the SCMM is reasonably appropriate to be used within the construction industry, however, they point out some deficiency's, to which they suggest some supplements in order to make it more adequate. Further, McGeorge et al (2011) introduces a proposal for how the SCMM can be adapted to the construction industry by developing a measurement criterion based on the SCMM, designed to describe the SCMM levels criteria in construction. This measurement criteria were converted into a questionnaire aiming to evaluate and determine the construction safety culture. It was designed with multi-answer questions regarding safety and safety culture, where the five options of answer provided (a-e) were connected to one of each level of maturity (1-5) presented in the SCMM by Keil Centre with the aim of determine which level the company has reached regarding that specific question of topic (McGeorge et al, 2011).

2.3 Complexity of Safety Culture

Richter and Koch (2004) study on Danish manufacturing companies suggests that there are multiple different safety cultures that are present on the production line and other parts in the organization. Hence, one culture is not enough to describe the safety culture for the whole organization. Richter and Koch further describe that there are common elements within the different cultures, but that it is still clear that the organization is a configuration of multiple cultures. In their study they illustrate this by a case study where three different cultures are present, namely Production, Welfare and Master. These three cultures have different views on safety and provides different attitudes, behaviours, and strategies to handle safety risks. Richter and Koch discuss three different perspectives on safety culture that stems from the organizational culture literature, these are; Integration, Differentiation and Ambiguity. *Integration* means that the culture is centralized and that there are little variations in behaviours within one cultural unit and that there is a common understanding in how tasks are executed. The integration perspective is often seen as centrally decided and controlled top-down. The *Differentiation* perspective on the other hand focuses on the lack of consensus in how tasks are handled, and often emphasizes that the sources of culture are decentralized. Meaning that the culture is decided from the cultures of the different individuals or groups. *Ambiguity* refers to the lack of clarity regarding safety, where the most significant is the ambiguity of intentions. The organization wants tasks to be performed safely and at the same time be performed faster and with minimal wastage, which often is achieved by sacrificing safety aspects. Ambiguity refers to the different interpretations of different cultural manifestations, which further translates into an uncertainty of what culture is present. The interpretation of the culture can also be different over time, whereas for example an individual can be more inclined to take

risks at times and be more risk averse during other. The study finds that there are elements of all perspective present in an organization. There are multiple integrative elements across the different cultures, and yet that differentiation is relatively strong and that there is also a presence of ambiguity.

Further adding to the complexity of organizational culture, and thus also safety culture, are what is discussed by Parker (2000) and Alvesson (1993) as multiple configurations. Both Parker (2000) and Alvesson (1993) suggests that the different levels of cultures such as macro, national and local, effects each other through overlapping, integration, and subordination. Pushing the notion of cultures as being heterogeneous and that the cultures of organizations can be seen as cultural constructs within a shell of already established cultures. Everyone is to different degrees connected to different cultural manifestations based on organization, organizational unit, gender, profession, ethnic group, nation etc. which describes the individuality of culture, and that different people are to different degrees able to adapt to a certain organizational culture.

The complexity discussed by Richter and Koch (2004), Alvesson (1993) and Parker (2000) provides a framework for how the safety culture in the construction industry can be interpreted and understood. A construction project is a construct of multiple different people from different organizations that interacts simultaneously over a period of time. The different involved organizations have their own established safety cultures before going into the project, and everyone within each organization have their own unique backgrounds. Thus, several different cultures are interacting during every construction project, and it becomes evident that the task of establishing a unified safety culture on a construction site is a very hard task.

2.4 Importance of a Strong Safety Culture

Multiple researchers have shone a light on the effects of different safety cultures being present within high-risk organizations and the importance of creating a unified safety culture. Prussia, Brown and Willis (2003) investigated how different perceptions of safety relates to accident prevention. The study found that differences in views of the safety between employees and managers gave raise to disagreements in accident causation. Which furthermore lead to unconstructive accident investigations and no organizational learnings from previous accidents. Prussia et al. (2003) forms their arguments with finding in management and psychological literature and argues that differences in safety perceptions leads to blame casting. Which is rooted in the tendency for people to blame external factors rather than ourselves. In post-accident assessments the authors found that workers tend to blame accidents on poor equipment and work instructions provided by management, and that management tends to blame the workers for not following safety guidelines and performing unsafe actions.

Instead, a unification of the safety culture should be highly prioritized in organizations that want to minimize accidents in high-risk work environments (Prussia et al., 2003;

Guldenmund, 2000; Kecklund et al., 2014). Prussia et al. (2003) expresses that a shared view on safety culture will make the managers and employees' perceptions about safety responsibility converge. Which in turn will lead to better post-accident assessments, and thus increase the overall safety of the workplace. Another characteristic of a strong and unified safety culture is when everyone participates in removing safety hazards on the workplace and engage in post-accident assessments to find causes for accidents to enable organizational learning (Prussia et al., 2003).

Baarts (2009) brings up the complexity of the interrelationships between individuals, pairs and groups practicing safety in high-risk work environments as the construction industry. Baarts (2009) presents the thoughts of every individual being their own safety officer and thus the necessity of looking after yourself and perform tasks in the right way are highly dependent on the individual. However, Baarts continues to state that taking responsibility for how you as an individual choose to perform your work regarding safety is also an act of collectivism, since it also contributes to a higher level of safety for those around you. This highlights the fact that the practice of safety being dependent on the individuals, however the effects of bad safety behaviours affect the collective. Furthermore, Baarts (2009) studies the importance of becoming a member of the group and discusses that newly arrived workers need to prove themselves to earn trust and respect from former workers. Baarts proceeds to discuss that becoming a member of the group is not only about the social game, but it also affects your safety. The authors discovered that being one in the group and being respected, changed the way workers behaved towards one another in terms of safety. To reprimand someone who does not belong to the group or have not earned the respect needed to become a member of the group seemed to be very unusual, even though it could jeopardize their safety. The workers justified this behaviour of not paying attention to others outside their group with; "He is stupid and bad at his job", "he is not one of us, why would I care" or "if it does not affect me directly, why would I care?". Baarts (2009) explains this discovery of how construction workers function in groupings and the excuses to not reprimand bad safety behaviours as violating the overall safety of the collective.

Even though it is clear that a unified safety culture is preferred in order to decrease work related accidents in construction it is very hard to achieve in practice. Guldenmund (2000) and Baarts (2009) means that this challenge is related to the complexity of the subject, as it is mostly impacted by psychological factors and behaviours. Which is deeply rooted within the minds of each individual person on the construction site.

2.5 Key Areas of Improvement

The following paragraphs will present previous research of key areas of improvement that serves to create a strong and unified safety culture in construction projects. The choice for the categorization is mainly based of key areas derived from empirical findings presented in chapter 4. These areas match quite well with the ten key areas that

is evaluated in Flemings (2001) Safety Culture Maturity Model but has been further categorized for convenience.

2.5.1 Communication and Leadership

Communication and leadership in this section is referring to the forming of safety culture and how the safety culture is distributed across the whole organization.

Communication and leadership play a major role in establishing a strong safety culture (Kecklund et al., 2014; Törner, 2011; Prussia et al., 2003; Dejoy, 2005). Prussia et al., (2004) emphasizes that in order to create a safe work environment everyone has to be involved in safety work. To achieve this, it is important to establish a safety culture that enables everyone to participate in safety work and to properly communicate these desired values and behaviours to the entire organization.

Safety culture has close connections to the organizational culture of an organization (Richter & Koch, 2004; Dejoy, 2005). In Richter and Koch's (2004) study, the safety culture is seen as a subset of the organizational culture, and thus is centrally decided by the top management of the company. To translate this into the construction industry, one can say that the responsibility for creating guidelines for the safety culture lies on the top management of the main contractor of a construction project. According to Prussia et al. (2003), top managers must establish a positive safety culture and enable the organization to focus on, and prioritize, safety. Kecklund et al. (2014) further emphasizes the role of top management by identifying the organization as a system containing multiple nodes. The authors further identify the interface between the different nodes in the organizational system as a cause for poor safety cultures. These interfaces include poor communication, high workload, financial pressure, poor routines, and lack of safety barriers. The inadequacies mentioned above are built into the organization by top management and could in most cases be compensated and handled by the workers, but if it is not compensated for, it may lead to lack in safety conditions and an accident can occur. Thus, some shortcomings in the safety culture can be compensated for by workers, but it is important that top management recognizes their responsibility to enable the workers to create safe working habits.

Törner (2011) studies different organizational psychological concepts and their effect on occupational safety, as well as how to successfully promote occupational safety within organizations. The study highlights the role of the construction management in communicating the safety culture to the workers on the construction site and pushes the notion of safety being relational rather than instrumental. Meaning that softer approaches such as trust and empowerment will have a greater impact on the overall safety on a workplace than harder approaches, such as contracts, written guidelines, and rules. Törner (2011) suggests the following mechanisms in order to increase safety; a leadership style that promotes cooperation, inspiring, fostering group goals and providing support and empowerment to individual workers. The authors argues that this

type of leadership may promote and develop mutual trust and a good working climate, which in turn might make the workers more likely to be motivated to contribute to the overall goals of the organization. In a similar way, management that are successful in demonstrating priority of the workers safety will gain trust from the workers and promote workers motivation to actively choose safe options and thus prevent accidents from occurring. Kecklund et al. (2014) further emphasizes the importance of engagement and participation from the construction management to create a good safety culture and to develop a good safety level throughout the organization. The authors means that the workers perceptions of the engagement of management affects the workers ability to adapt to the culture themselves. Thus, construction management can successfully communicate the safety culture by 'leading by example'.

Kecklund et al., (2014) further describes that an organization that wants to develop in its safety work needs to focus on and learn what the organization is doing good, and not just focus on its shortcomings. By doing this, it will create a more proactive view on safety and safety hazards will be dealt with before it turns into an actual accident, rather than being reactive and only focuses on accident prevention once an accident occurs. Fleming (2001) also supports this by stating that safety work shouldn't be driven by the fear of being prosecuted or other unfavourable situations, but rather it should be driven by the desire to prevent accidents and injuries for the benefit of the individual. Thus, this mindset might also be a way to create a more positive attitude towards safety.

2.5.2 Job Satisfaction

Gyekye and Salminen (2007) examines the relationship between job satisfaction, compliance with safety policies and accident frequency. The findings indicate that workers that perceive the workplace as supportive and expressed positive attitudes towards the employer, had a greater work satisfaction and where more compliant with safety policies, and thus also registered lower accident rates. The authors also imply that the perceived level of support in an organization is closely associated with the perception of workplace safety and other organizational and social factors, such as safety culture. Choudry, Fang and Mohamed (2007) also stress the importance of job satisfaction on safety in construction organizations. The authors means that it is important to manage so that workers must not be pressured to cut corners and perform unsafe actions. They even go as far to say that middle managers may turn a blind eye and even actively encourage the use of short cuts in order to meet deadlines. Kecklund et al. (2014) emphasize the importance of sufficient staffing, good working hours and good safety equipment to encourage workers not to take short cuts.

Previous studies have shown that workers that perceive the safety culture as negative, with characteristics such as high workloads and work pressure, tend to be more prone to work related accidents as they are more likely to engage in unsafe acts (Gyekye & Salminen, 2007). Similarly, another study suggests that unsatisfied workers tend to blame accidents on external factors, which refers to the characteristics of the works

environment, in post-accident assessments (Gyekye & Salminen, 2006). The other way around, workers with positive perceptions of the safety culture and a greater job satisfaction are less involved in workplace accidents and are more likely to blame personal factors for accident causation (Gyekye & Salminen 2006; Gyekye & Salminen, 2007). Gyekye and Salminen (2007) further explains that the extent to which workers perceive their organization as supportive and caring influences the workers perceptions of the safety culture. The study implicate that organizations could engage in and intensify interventions that demonstrates organizational support and concern for their workers to establish a better perception of support among workers. Examples of ways to do this could be by providing the right equipment, skill-training opportunities, job enrichment programs, visiting workplaces to alert workers of unsafe actions and openly expressing concerns for the workers safety.

2.5.3 Selection of Subcontractors

The literature connecting selection of subcontractors to achieve a better safety culture is scarce. Prussia et al, (2003) only briefly mentions employee selection as a way to achieve a strong unified safety culture. However, lots of research has been conducted about the effects of employee selection on the organizational culture (Sekiguchi, 2004). The employee selection can be compared to the selection of subcontractors, as the subcontractors has their own set of employees that will transfer over to the project organization. The connection between the organizational culture and safety culture has been elaborated on in 2.3, and due to the close relation between the two subjects' similar conclusions might be drawn from the organizational culture literature.

Sekiguchi (2004) and Schneider (1987) discusses the subject of person-organization fit, which refers to the extent of how a person and the organization share similar or compatible characteristics. Schneider (1987) suggests that people and organizations are an attracted to each other based on similarities, which further influences the actions of both parties, such as the applicants job choice behaviour and the organizations employee selection. Furthermore, the author emphasizes that people are not randomly assigned to situation, but rather that they seek out situations the are attractive to them. One such situation may be a company, that certain individuals are attracted to and remain with if both parties are content.

High levels of person-organization fit are connected to several different positive outcomes for organizations (Sekiguchi, 2004). Most prominently, the author stresses a positive outcome in job satisfaction as well as organizational commitment. Other positive outcomes include prosocial behaviours (which refers to the intention to benefit other through for example helping, sharing, and cooperating) and work performance (Sekiguchi, 2004).

Furthermore, the amount of self-performed work and relationships with subcontractors effects the safety culture. Molenaar, Park and Washington (2009) studied an Australian

construction company that subcontracted almost all of their work and compared it with less subcontracting companies and found that an increased use of subcontractors affects the safety culture negatively. The authors further explains that a homogenous safety culture takes year of work to achieve with the same employees. This indicates that a fewer number of subcontractors and long organizational relationships are to be preferred when the goal is to create a strong and unified safety culture.

2.6 Subcontractors Compliance with Safety Culture

Halse et al. (2009) studies safety and accident prevention in small businesses in the construction and metal industry. The aim was to study how small businesses work with accident causation and possible learnings about accident prevention after an accident has occurred. The study finds that accidents are often reported as a cause of unforeseeable circumstances, or to be the fault of the worker. This might be the case as an accident can be negative from the small businesses point of view. The reason for this is because the owners want to be able to report accidents as unforeseeable to not be held accountable, so once the worker has recovered, he/she goes back to working under the same unsafe conditions. Halse et al. (2009) means that this paradox must be coped with in order to get small businesses to work proactively with accident prevention.

Halse et al. (2009) also notes that small enterprises usually have a limited number of resources both financially and regarding management, thus it is harder to assess and control work related risks compared to bigger enterprises. The same person that has to deal with safety management is often the same person that has to deal with issues such as planning, sales, finance, human resources et cetera, and sometimes this person also is involved in operational work as well. This makes small businesses more prone to be using an ad hoc basis for problem solving and little is documented regarding health and safety. The authors also discusses that that the personal values and attitude of the owner are key determinants of the culture in the company regarding safety and the work environment. Wadick (2010) emphasizes the carefully balanced tension between cost, production, and safety for managers at subcontractors. The authors means that subcontractors usually see safety as common sense and that they rely on workers not getting hurt, as an injured worker won't be able to make money for the company. Furthermore, Wadick (2010) mentions that many resists safety rules because they don't find them important enough, and thus only makes their lives more complicated.

Halse et al. (2009) argues that a positive learning approach might be the way to go if small enterprises want to achieve effective accident prevention. Instead of working with accidents once they occur, companies should work proactively with safety to find ways for continuous improvement. This solidifies the need for educating small enterprise owners and managers about accident factors and attribution.

3 Methodology

This chapter describes the methods used to perform this study. The chapter begins with describing the research design and further describes how the conducted literature study and empirical study were carried out. Thereafter, the creditability, confirmability and generalisability of the study is discussed based on the chosen methods.

3.1 Research Design

The study was conducted and analysed through a combination of previous research and qualitative empirical findings to make assumptions and to find explanations for the research questions. Qualitative research methods are characterized by an overall interpretative knowledge theory which emphasizes how people interpret social reality and act upon these interpretations (Bryman & Bell, 2017). The choice of using a qualitative approach was due to the complexity and the explorative nature of the subject as it enables the researchers to be more flexible (Bryman & Bell, 2017). Safety culture consists of set of complex elements such as attitudes, behaviours and values that are influenced by individuals through psychological factors. This makes it hard to quantify different parameters affecting the culture and thus the research questions are better of studied through a flexible qualitative research method (Bryman & Bell, 2017). Furthermore, a qualitative research method adds to a deeper understanding of the research subject, but it also makes the results harder to analyse as it is highly dependent on the interpretations and understandings of the researcher (Bibik, Milton, Månsson & Svensson, 2003).

The research was performed as a qualitative case study in collaboration with JM, one of Sweden's leading housing construction companies (JM, 2021a). The company operates in Sweden, Norway and Finland and reached 15 billion SEK in turnover in 2021 and has over 2500 employees (JM Annual Report, 2021). Furthermore, the company is in the forefront of safety construction and identifies their employees' health and safety as a success factor in creating a well-functioning organisation and workplace, with a goal of having no sick leaves due to accidents on their construction sites in 2030 (JM, 2022). Even though the study is conducted within one company's ecosystem, the study makes use of multiple different construction sites in the area of Gothenburg. This might serve as a multiple case study where each different construction site can be seen as an individual case study. Though it is important to note that each construction site still stems from the same company and safety guidelines, and what differs each construction site are the management and the unique characteristics of the projects. However, in this study, empirical findings from different construction sites were not distinguished and analysed in isolation. Instead, the empirical findings from each different project served to broaden the results of the overall study of the ecosystem of JM.

When conducting qualitative research there are no set out rules for how the study should be conducted, which enables the researchers to find an appropriate method (Bibik et al., 2003). The type of research model that is used in this study is what Dubois and Gadde (2002) refers to as ‘systematic combining’. Systematic combining explains an iterative use of theoretical and empirical sources of information (Dubois & Gadde, 2002). The authors explains that the theoretical framework directs the empirical collection of data, but that the framework might change over the course of the research project. In the case of this research project, a theoretical framework created the premises of formulation of interview questions for the empirical data collection. Furthermore, unanticipated yet related empirical findings led to a continuous iteration and expansion of the theoretical framework, in order to match empirical findings and the theoretical framework. This is what Dubois and Gadde (2002) refers to as ‘matching’ and is motivated by the fact that empirical data should not be forced to match with the theoretical framework as it might limit the understanding and emerging of new findings. Matching is one of two fundamentals for systematic combining. The second fundamental part of systematic combining is ‘direction and redirection’ and refers to iteration of the aim of the research project in order to achieve matching between the framework and empirical findings. Empirical findings are used to redirect the theoretical framework and vice versa (Dubois & Gadde, 2002).

Systematic combining is grounded in an abductive research logic, where empirical and theoretical findings continuously evolved the trajectory of the research (Dubois & Gadde, 2002). Which in turn deemed suitable for the exploration of new understandings and conclusions. Several unexpected empirical findings during the research process influenced the project to new directions which in turn had to be supplemented by a change in research questions or the theoretical framework. For example, answers from the interviews gave rise to new understandings of parameters that affects the safety culture, which in turn required these new parameters to be further evaluated in the theoretical framework.

3.2 Literature Study

The literature was initiated to form a basic understanding of the subject and to narrow down the scope of the research problem. The first iteration of the literature study was used to give direction to the research project but has later been revised multiple times based on new empirical findings. When new interesting leads appeared, these required to be backed up by previous research in order to get a nuanced understanding and discussion about the subject. Thus, in some cases, empirical discoveries served as a guide for what literature to include in the theoretical framework.

Search engines such as Chalmers Library and Google Scholar were used to find suitable literature. Thereafter, complementary literature was find using a snowball method, were references from articles was studied to get a wider understanding of the theoretical framework. The following words were used, but not limited, to find literature such as

scientific articles and publications, these words were either searched for singularly or in combination with each other:

- Safety Culture
- Safety Culture Maturity Model
- Construction
- Accident Occurrence + Construction
- Accident Prevention + Construction
- Safety Communication + Construction
- Job Satisfaction + Accident Occurrence
- Subcontractors + Safety Culture
- Shared Mental Models

The literature used for the theoretical framework consisted of knowledge about safety culture, accident occurrence and parameters affecting the compliance of overall safety culture within high-risk industries. Requirements for the chosen articles used in the theory were that they were peer reviewed, and furthermore, articles were chosen based on number of citations and relevance. The insights gained from the literature study was then used to formulate interview questions to add depth to the discussion and analysis of the research questions.

3.3 Empirical Data Collection

The empirical data collection was conducted through several different sources. The study made use of interviews with people in strategic positions as well as people working in different levels of production, the interviews were also complemented with observations on construction sites and meetings, as well as internal documents such as contracts, safety guidelines and other steering documents.

To set the framework for the study, meetings with the two supervisors from the company were conducted. Thus, how the company is structured and working today regarding safety and safety culture was explained, hence the aim of the study could be agreed on and determined. The supervisors introduced the Safety Culture Maturity Model (SCMM) which became one of the main frameworks of this study, used to map the safety culture within the company. Further, the supervisors provided documents regarding their safety regulations and examples of contracts and how they communicate their safety regulations and requirements when hiring subcontractors. These documents gave the opportunity to get a deeper insight whether the information regarding safety has any shortcomings already in how it is communicated in the first step when a job is to be procured.

3.3.1 Interviews

An interview study was conducted with semi-structured interviews, meaning that a framework of preselected interview questions was used. However, to complement, supplementary questions were asked during the interviews, depending on the answers received. Semi-structured interviews enables the interviewee to openly reason about the topic and thus enables the researchers to gain more in-depth information and insights (Bryman & Bell, 2017). On the other side a semi-structured interview methodology puts more pressure on the interviewer, as it is the interviewer's responsibility to guide the interviewee in the right direction with follow-up questions (Bryman & Bell, 2017). The downside to the semi-structured interview approach is that some information might be misunderstood (Bryman & Bell, 2017). One way to cope with misunderstandings is to make use triangulation of several data sources, which is covered in section 3.4 Credibility, Validity, and generalisation.

The interviewees were briefed about the subject for the interview before deciding on whether to be a part of the study or not as a means of good research conduct, and to provoke the interviewee to think in terms of safety culture beforehand. This was especially important as the interview questions was not sent in advance and thus it gave the person a chance to prepare for the interview to some extent. The reason for not sending the interview questions in advance was because of how it would affect the answers. Safety culture is decided on management level and the organisation wants the employees to perceive the culture in a particular way. Thus, sending the questions in advance might lead the interviewee towards reading up on how the organisation would answer the questions and thereby losing the interviewees personal perception and honesty in the study.

Notes were taken during the interviews and the interviews was recorded with the consent of the interviewee. This enabled the researchers to go through the interviews afterwards and to transcribe them to find information that might not have been noted during the interview. The interviewee was once again briefed and reminded about the topic and scope of the interview before the interview started. Both authors were participating in all interviews, and the tasks were divided as one asked the questions and the other one was taking notes. The majority of the interviews were conducted at the site office or workplace of the interviewee, however two of the interviews were conducted digital via Teams. The interviews lasted for around 30 minutes to an hour, however some of the interviews lasted for a longer period of time, up to one and a half hour and so forth. The longer interviews enabled for more in-depth discussions and exemplifications of problems and questions from the interviewees daily work.

3.3.1.1 Interview Questions

The interview questions were divided into four different sections. The first section consisted of general questions about the background of the interviewee. The second set of questions were used to map the interviewees overall attitude towards safety culture.

These questions were developed and established using a framework of questions developed by McGeorge et al (2011). McGeorge et al. (2011) developed a set of questions that could be used in studies to assess on what level a construction company is located based on the Safety Culture Maturity Model (See 2.2 Safety Culture Maturity Model, in theory). Hence, the SCMM model is used in this thesis as a tool to identify individual persons attitudes and behaviours regarding safety, rather than mapping the safety culture of the whole organisation. By doing this, it is possible to compare the attitudes, behaviours, and values of interviewees with different backgrounds and roles to find patterns that could help develop the authors understandings of what parameters affect the safety culture compliance in organisations.

The third section of interview questions was regarding communication and how well informed the interviewee was on the safety guidelines and requirements on the construction site. Communication plays a major role in the establishment of a safety culture as safety culture is formed by common attitudes, behaviours, and values. The fourth and final section of interview questions were more general and formulated to promote discussions about topics such as principles, barriers, and enablers for improved safety culture. At the end of the interview the interviewees were asked if they had something more to add or any questions regarding the interview.

Furthermore, the interview questions were tweaked based on what role the interviewee have in the organization as some questions were situational. For example, some questions differed when interviewing a production manager, that was situated at the office rather than in a certain project, and when interviewing a subcontractor on a construction site.

3.3.1.2 Interviewees

Twelve interviews were conducted with people in different roles and positions within the company of investigation. The interviewees were chosen based on their different roles, experiences, and background with the aim to provide comprehensive information about their perceptions of the company's safety culture. The twelve interviews conducted consisted of four with site managers, four with foreman's, two with senior executives and two with project managers within subcontractors. Down below the interviewees role, gender, age, and years in the industry is stated to provide an overview of their general experience which may have an impact on their answers to the interview questions.

Site manager 1 – Male, 49 years old, 16 years in the industry.

Site manager 2 – Male, 57 years old, 22 years in the industry.

Site manager 3 – Male, 42 years old, 20 years in the industry.

Site manager 4 – Woman, 30 years old, 7 years in the industry.

Foreman 1 – Male, 45 years old, 22 years in the industry.

Foreman 2 – Male, 26 years old, 3 years in the industry.
Foreman 3 – Male, 32 years old, 5 years in the industry.
Foreman 4 – Woman, 23 years old, 1 year in the industry.

Senior executive 1 – Male, 42 years old, 12 years in the industry.
Senior executive 2 – Male, 50 years old, 20 years in the industry.

Subcontractor 1 – Owner, Male, 39 years old, 20 years in the industry.
Subcontractor 2 – Site manager, Male, 58 years old, 22 years in the industry.

3.3.2 Observations

To complement the interviews non-participation observations were carried out, which according to Bryman and Bell (2017) means that you as an observer only observe and do not participate in the ongoing situations. The observations were made by joining and listening to a region's meeting regarding safety and work environment, where the regions site managers and senior managers participated. Also, several construction site visits were performed, and a weekly safety round were joined, conducted by a foreman and a construction worker with the role as safety representative. This provided an overview of the ongoing work at construction sites in different phases, what is noticed during safety rounds and an idea of how safety and work environment are discussed by senior managers and site managers.

3.4 Credibility, Confirmability and Generalisability

The use of multiple empirical data sources allowed for triangulation of findings, where findings from one source of data could be confirmed by other sources, adding to the credibility of the study. This type of use of multiple different sources of data is the most commonly used in qualitative case research and is an effective way of achieving research credibility (Dubois & Gadde, 2002; Bryman & Bell, 2017).

A literature study was performed to gather information about previous research to help the authors create further knowledge about the subject and to create a framework for the study. Thereafter, empirical data were gathered through conducting several interviews with people of different gender, age, background, role, and experience. The interviewees were chosen based on their differences, due to wanting to get an overall view of different people's perception of the safety culture. By choosing people with different backgrounds and attributes it is possible to cover differences in the whole population of the study area and thus the answers of different interviewees can be used to confirm the others (Bryman & Bell, 2017).

Furthermore, the majority of the interviewees are all working in the same company or being a subcontractor with close relationship with the company of investigation. This might result in that their answers to the interview questions may be influenced by for

example their attitude towards the company and how satisfied they are with their work and their position. To also consider is that people in general might be afraid of saying something negative about the company they are working for, thus some answers might be biased. This was handled through ensuring anonymity of the interviewees. Also, the interviewees' perceptions and interpretations of the questions as well as their general knowledge about safety culture are factors that may have affected the result of the interview study.

The use of a case study of one company as the study object also affects the generalisability of the study (Dubois & Gadde, 2002). A lower sample results in a lower generalizability of the empirical study, but it also allows the authors to study the problem more in depth. Thus, in this study, the generalisability of the empirical results has been sacrificed for depth. Which Dubois and Gadde (2002) regards as a strength of case studies and enables for a deeper exploration of the research questions. However, the generalisability issue has been dealt with in the research design through systematic combining. By going back and forth between empirical findings and theory, it is possible to use previous research to validate the empirical findings, and thus it serves to increase the generalisability of the conclusions of the study (Bryman & Bell, 2017).

3.5 Analytical Method

The collected data was analysed through what Bryman and Bell (2017) refers to as 'Grounded Theory'. This implies that the information gained from interviews was categorised into different concepts to help the researchers to understand the results. This process continued throughout the whole interview process and was used to continuously group data and elaborate the direction of the study. Some of the discovered categories needed to be investigated more in-depth, which led to reiterations of the interview questions. This was particularly useful as the empirical data collection was divided into different phases, with the first phase being discussions with supervisors on the case company, followed by sharp interviews with construction managers and lastly interviews with subcontractors. For example, the interview questions for the subcontractors were impacted by empirical findings from the interviews with construction managers.

After the empirical findings had been categorised and the last interview had been conducted, the categories of investigation were complemented with theory from previous research by using what Dubois and Gadde (2002) as 'systematic combining' discussed in 3.1 Research Design. The combination of theory and empirical findings enabled for a deeper discussion of the categories that could further be translated into a conclusion of the research questions and furthermore implications for practical use.

4 Empirical Results

This chapter presents the results from the interview study. The chapter begins with some general information about workplace accidents and their causes and continuous with problems and possible improvements to engage everyone in the safety culture.

4.1 Workplace Accidents

4.1.1 The Interviewees Definition of a Workplace Accident

The definition of what is to be considered as a workplace accident seems to be rather similar comparing all answers from the interviewees, regardless of their role and experience. However, some differences were encountered concerning how severe the consequence of the accident needs to be, to be considered an accident and not only an incident. Thus, some argued that accidents resulting in that the person affected needs to seek medical care or needs to take some days off are the accidents that should be considered being a workplace accident. Hence, accidents resulting in smaller injuries, such as a small cut in a hand or that someone trips over something, is to not be considered being an accident, but rather as an incident according to the interviewees. Meanwhile, few of them stated that workplace accident should refer to all incidents and accidents regardless of their extent. However, all interviewees seemed to be agreeing upon that all accidents are to be taken seriously, regardless of their consequences. As well as efforts to eradicate the risks of incidents to happen should always get a lot of attention.

“A workplace accident is something that happens at the workplace when performing a work task resulting in that the person needs to seek for medical care or apply for sick leave”

- Foreman

“A workplace accident is something that happens at the workplace when performing a work task, regardless of the consequences, all incidents that results in an injury, small or major, should be considered a workplace accident”

- Foreman

“An incident or injury that happens at the construction site should always count as a workplace accident, regardless of if it’s someone who cut their hand, sprained their ankle or a more severe injury. Our goal is to reach zero incidents that could result in small or major injuries”

- Site manager

“Our priority is that everyone could leave work in the same condition as they came, and everyone should feel safe performing their work”

- Subcontractor

4.1.2 Safety Responsibilities

When wanting people to act in a certain way regarding safety and to be responsible of how they perform their assignments, a factor to consider is who people consider to be responsible of the safety. Not very surprisingly, almost all of the interviewees answered that the BAS-U is the person responsible for the safety, which in the majority of cases are the site manager. Furthermore, the site managers mentioned that most probably people who risk suffering the legal consequences if safety is not followed, often are the ones who take the most responsibility when it comes to safety. However, except the site manager being ultimately responsible for the safety on the construction site, some interviewees recognized that all individuals should take responsibility of their own safety and by common sense be able to make decisions about how they will behave and perform their work task.

“I'm the one responsible for the safety of the construction site since I'm BAS-U, however everyone should take their own responsibility of their safety since I can't go around and look after people all the time”

- Site manager

“BAS-U, the site manager, are responsible of my safety and the safety on site or my manager are responsible for my safety”

- Foreman

“BAS-U are responsible for the overall safety of the construction site; however, I am the one responsible for my own safety, all individuals are responsible for their own safety”

- Subcontractor

4.1.3 Reporting of Incidents and Risk-observations

For the reporting of incidents there are routines to follow that are set by the main contractor. On every construction site there is a guide that can be used when an accident occurs. For minor incidents it is enough for the site manager to report them into a database. However, for more severe accidents, higher management as well as The Swedish Work Environment Authority and insurance companies needs to be involved.

To prevent accidents and to highlight risk-observations weekly safety rounds are performed. During these rounds a foreman and the safety representative of the construction workers are present, and their assignment is to document possible safety hazards and to make sure that they are handled. The company of investigation were using an app to report risk-observations and incidents. The perceptions of the app were that it took some time to get used to as it wasn't very intuitive. Thus, the intuitiveness of the app was mentioned as a barrier for reporting minor incidents or accidents as it made it more time consuming. However, if a more severe accident occurs, the site manager has the responsibility to report it.

If an accident still occurs the importance of having certain standards to follow on how to handle the situation, especially if it being a more severe accident, are of great importance. Also, the people on site needs to be well aware of how to follow and use these standards properly. The site managers and foremen of the examined company perceived themselves as being well aware of how to follow these routines and explained. Furthermore, the subcontractors explained that as them being hired by the main contractor they must follow the safety reporting standards set by the main contractor. Hence, it could be difficult to be fully aware of how the main contractor handle accidents as their safety deficiencies or incidents and accidents are reported within their organization.

“I feel like I have an overview of how their safety reporting and standards for accidents work, however I do not know exactly since they take care of it themselves due to them being overall responsible. But I do not feel like that is a problem”

- Subcontractor

“Every week we do safety rounds where all encountered safety risks, it can be everything from that it is too dusty, wires hanging down from the ceiling or a hole that need to be covered to prevent people from falling, are reported into an app with pictures and location so that it can be fixed as quick as possible”

- Foreman

“We use the app to report risk observations, but I've heard that some think that the app can be a bit un-intuitive at first and time consuming, so maybe the app would be used more of the workers out on site if it was more simple and quicker”

- Senior executive

“We have proper routines to follow in the event of an accident, there is also a guide to use on site when you may be stressed or shocked. For minor incidents, the site manager reports it into a data base, but then it is required that the person comes in and tells you that they for example have fallen or cut themself.”

- Site manager

4.2 Awareness of Safety Rules and Standards

All interviewees employed at the company under investigation had the perception of being well aware of their organization's safety rules and standards, regardless of their role as a site manager or foreman. However, some of them mentioned that how aware you are also are dependent on how dedicated you are. The information is available, but it is to some extent your own responsibility to take part of it. Further, all site managers mentioned that due to them being ultimately responsible for the safety on site, as they are as called BAS-U, could be explained as being construction work environment coordinator. Thus, if the safety standards are not complied with, they will suffer the

consequences, hence, they consider it being very important to be well informed about the rules that apply.

“I would say that I’m well aware of our safety rules and standards, and I think that everyone within our project would agree with that”

- Site manager

“I would say that I’m well aware of what rules applies and if it changes, we will receive information about it immediately”

- Subcontractor

Furthermore, regardless of the awareness of the applicable safety rules among the main contractors' own employees, the challenge is to make sure that all subcontractors visiting the site also are aware of the safety rules and standards. The expected premise is that everyone who comes to the construction site to perform a job knows which rules that apply and brings the right equipment and the right tools with them. Yet, it was expressed by some of the interviewees that this is not always compiling with the reality. However, it was stated by both the senior executives and subcontractors, who are present when projects and work are procured and agreed upon, that information about safety rules and standards are presented, and complicated situations which may occur are reviewed. All safety rules that apply on the construction site of the main contractor are presented and stated in the contract, and if not compiled with the penalty is described. However, mentioned by some of the interviewees was that the safety rules should be more thoroughly described in the contracts since there now are room for misunderstandings and interpretations depending on who is the receiver.

These safety guidelines are furthermore communicated by the managers at the subcontractor to all of their workers, as well as changes happening during the course of the project. Also, preparations of the work tasks and guidelines of how they should be performed are discussed and planned for by both the subcontractor's manager, and the site manager or foreman responsible of that specific work task. This is done trying to eradicate difficulties that might appear and affect the work and to be prepared for what is to come. Furthermore, there is a requirement that everyone should register on the first day on the construction site. During the registration, each person verifies that they have informed themselves about the safety requirements and guidelines for that particular project.

“We always discuss safety and our expectations on how they will work regarding safety, also work that may be difficult are discussed and planned for in advance trying to minimize the risk of these specific situations”

- Subcontractor

“I would say that everyone within the site management and managers of the subcontractors are well aware of the rules that apply regarding safety, we have good routines for information. However, how you choose to obey them or not is up to the individual... Hence, I would wish for some more follow-ups to repeat the rules and communicate about how the collaboration is working”

- Site manager

“All safety rules and standards are presented, and we are well aware about how we should work to follow them. Also, when there is an update, we are provided with that information directly”

- Subcontractor

“I think that the communication and collaboration with the examined company are well functioning, and you are provided with the information needed to be able to follow their way of working regarding safety”

- Subcontractor

4.2.1 Safety Education

To have the permission to work at a construction site you are required to have taken the course Safety Construction Training created by the construction companies who are members of the association Byggföretagen. This course handles general information about safety, personal safety equipment, what safety equipment to wear when performing certain work and so forth. Safety Construction Training is valid for five years and then you need to perform it again. To compliment you also must take other courses to have permission to perform lifts with a crane or work that includes high temperatures. As these works are assumed to be of a more dangerous nature and you should be observant to minimize the risks when performing them.

Generally, the different educations were seen as positive for the overall work environment. However, a theme that occurred frequently during the interviews was that the educations are a bit too theoretical, and that many of the interviewees would wish for a more practical learning approach as well as using more realistic cases. Many of the interviewees also mentioned that they would wish for more follow-ups on the courses, to ensure that everyone still has sufficient knowledge and thus are able to perform tasks safely. This is particularly important for education regarding tasks that are performed with a long time in-between each time. Thus, it is easy to forget from time to time and to fall back into old habits of how the work was performed before attending the course.

“I think that the safety educations are good, however sometimes I would wish for them to be a bit more realistic... For example, construction sites do not always have perfect flat ground that enables trucks to get unloaded easily and no external disturbances, such as pedestrians, as is usually shown in the work environment plan.”

- Site manager

“I think the safety educations are good and they treat situations that are important to be attentive in or otherwise can be very dangerous. Thus, I would wish for some more follow-ups, and refreshment more often!”

- Foreman

“The safety educations are important, and they teach about common and dangerous situations occurring almost every day at a construction site, but I would wish for more follow-ups since people easily falls back into old habits and forgets about what they learnt at the safety education, especially when feeling stressed”

- Subcontractor

4.3 Problems with Engaging Subcontractors in the Safety Culture

4.3.1 Attitudes Towards Safety

Regarding the main reasons behind why incidents or accidents occurs at construction sites, all interviewees shared similar perceptions. They explained that nowadays, accidents rarely depend on poor safety regulations or safety not being prioritized. Accidents happen when people disregard following the regulations, stop paying attention to what is happening around them or are being lazy and tries to take shortcuts. Another thing that was mentioned were that people easily fall back into old patterns trying to perform a task as they always have, regardless of the efforts that may have been made to improve the safety when performing that specific task. Another commonly encountered reason for accidents to occur, mentioned by all twelve interviewees, were the excuse ‘I’m just going to...’, which refers to people taking shortcuts instead of prioritizing safety. An example of this is when someone is using a box which is conveniently located to reach a high place instead of going to get the correct ladder.

“It's probably easy to think that I will just fix a quick thing and are therefore being inattentive, does not care to get the right equipment or to do it the right way. Unfortunately, this is often when an accident occurs.”

- Site manager

Discussing the reasons behind why these types of behaviours arise, one site manager mentioned that it's probably easy to become 'home blind' and therefore stop noticing what your surroundings look like. Also, the reasons for taking shortcuts and not using the proper equipment could be due to stress, which were mentioned by all interviewees as the factor that affects nearly all work performed at the construction site. Furthermore, mentioned by some of the interviewees were the mindsets 'it does not happen to me' or 'human beings tend to learn from their mistakes' which not unexpectedly affects the behaviour of individuals. Several examples to why these types of mindsets keep existing were brought up. Four of the interviewees mentioned that the construction industry is a male-dominated industry and that men, especially young men, are proven to be more risk-taking than women, as one explanation. Furthermore, another example brought up was; if you are riding your bike without wearing a helmet and falls and hits your head, you will most likely wear a helmet next time you ride a bike. This example could according to the interviewees show how mindsets like this can affect the behaviour of workers. Also, that the consideration of risks as well as awareness of possible consequences in many situations are lacking and that something needs to go wrong before changing a behaviour is considered.

"I think that it's easy to become 'home blind' and stop paying attention to your surroundings and thereby you stop noticing things which could become a safety risk"

- Site manager

"I think that the fact that the majority of people active at the construction site are men of younger age plays a great part in why safety regulations are not fully followed. Men, and especially men of younger age are more willing to take risks and their consequence thinking is flawed"

- Subcontractor

4.3.2 Conflict Between Safety, Time, and Money

Most of the interviewees said that safety should never be compromised with, regardless of other aspects such as time frames or budgets that may put pressure on the project work to increase in speed. Aspects as time and money might also create a conflict with safety when there are to be decided how a situation should be carried out. However, even though safety should have the highest priority, some interviewees mentioned that this is not always the case in practice. Furthermore, the interviewees testified that during their years within the construction industry a great change regarding the importance of safety and the prioritization of having a safe work environment have occurred. Today safety should always be considered as the most important aspect. Hence, if the construction work cannot be carried out safely, the work should be interrupted, and the working method changed before continuing. However, external factors such as stress may have a negative impact on safety at the construction site. Thus, most of the interviewees mentioned stress as a predominant factor affecting the safety on site. Due to stress, the

behaviour of the workers seems to change, one might overlook certain safety routines and perform tasks as quickly as possible and do not prioritize having the right equipment. Which might end up being the factors that make the difference between whether an accident occurs or not.

“For example, if you assemble prefabricated walls or pouring concrete and deliveries do not arrive as agreed and drivers get frustrated due to them having to wait for the one before them, you may start to work faster due to the truck drivers pushing you. Or another example is if you are missing some people resulting in for example the driver unloading his truck using the crane without having the proper training for unloading for example walls, unfortunately this is when accidents or incidents occur”

- Foreman

“Feeling stressed during work may result in people rushing around, not getting the right equipment or forgetting important equipment or standards, then they lose track of what's going on around them and then it's easy for something to go wrong”

- Site manager

“A time ago I decided to stop the construction work due to that I felt it was too risky to proceed due to lack of people and time pressure. If we would have continued, I think that something would have gone wrong. It was the right decision, and I was also supported by the top management”

- Site manager

4.3.3 High Number of Involved Actors and relations Between the Main Contractor and Subcontractors

As main contractor you hire multiple different subcontractors for each project, and these subcontractors might hire their own subcontractors. Which makes it hard to keep track of all of the different actors involved. These different companies also have their own different backgrounds and established cultures. To affect another organization to change their behaviours and values regarding safety was to be considered as quite difficult by the main contractor. However, the interviewed subcontractors seemed to have a different view of it. Arguing that it might be easier as main contractor to affect subcontractors to change their behaviours since company fines, personal fines and to send people home and demanding for new workers from the subcontractor could be used as tools to take control or affect people to change. Further, the contract between the subcontractor and main contractor could also be used as a tool, due to if the written agreement is not followed the main contractor could refuse to pay, demand for fines, threaten with choosing another subcontractor and so on. However, the main contractor stated that regardless of fines being issued, sometimes that is not enough to change how people behave or work. It is then stated that you have the mandate to send people home,

however as main contractor you are dependent on the subcontractors to be able to carry the project forward. Sending people home would in that sense be to put yourself in a difficult situation due to the often highly pressured time frame that must be followed and the lack of workers. Some interviewees also mentioned that it is an uncomfortable role to be the one telling everyone to follow safety, you often met with negativity. Furthermore, you don't want to end up in a disagreement with people on site.

Some subcontractors can be seen as harder to work with than others. A thing that appeared during the interviews was that subcontractors that are doing shorter jobs on the construction site are harder, if not impossible, to engage in the safety culture. According to a few interviewees, these subcontractors seem to care less about safety. Furthermore, also mentioned by the interviewees was that it is easier to work with subcontractors that you have long relationships with, compared to hiring new ones. The new ones often need more attention to adapt to the safety culture, meanwhile the old ones already have a good understanding of the safety culture.

“To be able to take control and change the way subcontractors act about safety, the only way that works is the hard way, meaning be in contact with their boss, carry out fines or finally send someone home and tell them that they are not welcome back, and sometimes not even that is enough”

- Foreman

“Unfortunately, we are in a position of dependence on the subcontractors, hence avoiding dismissing people from the construction site is probably more common even if they misbehave or do not compile with our safety standards. Thereby, our sayings about sending them home or issue fines becomes empty threats, and we lose power”

- Site manager

“We would like the site management of the main contractor to be even more demanding regarding safety, we want to work as safe as possible in the sake of our employees and if the main contractor pushes on, we need to develop further. I would like them to dare to be tougher”

- Subcontractor

“I think that we are to accepting and need to be stricter about the safety rules if we want to people to follow them”

- Senior executive

“It is always easier to work with a company that you have a long relationship with, hopefully you have gained a good connection, knows how they want you to work and their standards. It is also easier to collaborate and have a good communication about how to work together.”

- Subcontractor

4.3.4 Language Barriers

Further, mentioned by some of the interviewees were problems in communication due to language barriers. This seems to be an increasing problem since foreign workers seems to become more frequent in Sweden, due to the senior executives it is due to lack of construction workers in Sweden. Thereby, communication of the safety rules and standards can become more difficult due to them not being available in enough languages and some foreign workers do not speak English and more rarely Swedish. To also consider is that foreign workers come from a different background where culture, values, prioritization, and hierarchy might be different compared to the Swedish construction industry. Thereby, the challenge of changing people's behaviour in general, not only regarding safety, could become more demanding.

“Sometimes it is very difficult to convey and be understood about which rules apply ... You expect their manager to have informed them about what applies in the workplace, before they come here, but unfortunately this is not always the case”

- Foreman

4.4 Possible Improvements to Safety Culture

4.4.1 Increased Engagement from the Site Management

Since the site management are the ones in closest contact with the people working at the site, they also have the chance to influence the most. Hence, this puts pressure on the site management to communicate and take the lead on how to behave and prioritize safety. To make it possible for the site management to pass on the organization's values about safety culture, the site management needs to be well informed and aware of the organization's safety rules and standards. Which thus is dependent on the organization and how they choose to communicate with their employees and ongoing projects.

The interviewees agreed that the site management is the most important factor to establishing the safety culture. However, this requires the site management, thus the foremen and site manager, to take on that task and cope with the accompanying responsibilities. As a result, it ends up at the individual level of responsibility to ensure that safety is followed. Hence, safety culture might differ between different projects and groups since it is in great dependence of the individuals of that group. Furthermore, the safety culture is also highly dependent on the site managements perception of safety culture in general, how important reporting of safety issues is considered and also how one chose to take care of those recognized risks, regardless of their extent.

Furthermore, it was mentioned that it is important to set the boundaries and establish the safety culture early in the project. Most of the interviewees agreed that the safety culture is decided in the early phases and that site management must be strict and push the project in the right direction. Some interviewees described as the project might need

some sacrifices in order to establish a sense of seriousness regarding safety, emphasizing that site management might need to punish workers after getting multiple warnings. For example, by giving the subcontractor a fine, as according to the contract signed by the main contractor and the subcontractor. The interviewed subcontractors even thought that the site management should be stricter on this premise, as they also want a safer work environment. Though, in many cases site, managers are too forgiving and thus doesn't set an example for the safety culture. Workers are rarely sent home as a cause of multiple warning or send a fine. The reason for this is that they don't want to end up in a disagreement and be disliked, and that it gets annoying to tell people what to do all the time. Also, the way of telling people to obey safety guidelines also depend on who you are, your experience and your role. Hence, safety culture becomes dependent not only on the values of the site management group but also on how they chose to behave when encountering safety risks or insufficient safety performance among their workers. One person also mentioned that it can get hard to go around and order people to work in a specific way, if the one ordering it doesn't share this view with the main contractor. The same thing goes with changes ordered by the top management that does not always comply with reality. Some site managers mentioned that top management could have quite optimistic visions that might be hard to communicate or practice as it is not realistic.

Another thing that was mentioned regarding time and stress is the amount of responsibility that is put on the site managers. At one of the construction sites, they had chosen to experiment and have two site managers instead of one. The two site managers both agreed that they considered themselves to have more time to allocate towards tasks that has been less prioritized earlier, but that is still very important. Such as, being out on the construction site and observe instead of in the site office, making it easier to monitor things such as safety. Other site managers mentioned that they felt like they didn't have enough time to allocate towards every responsibility area that they are in charge of, and thus some important areas might be forgotten.

“It is important that we always set a good example and never neglect safety, otherwise it is difficult to get others to follow the rules if you do not do it yourself”

- Foreman

“At the beginning of a project, it is extra important to be strict with the rules that apply, because it is impossible to later try to get people to follow something that you ignored at first”

- Site manager

“The site management needs to be very strict with following the safety standards from the beginning, I want them to push us harder, I think they sometimes are too forgiving”

- Subcontractor

“No matter how tiring it might feel, we must continue to nag about safety, that you should wear your glasses, button the helmet, use a harness when doing dangerous jobs, etc. We can never stop because then people might think that it is suddenly okay to neglect safety”

- Site manager

4.4.2 Positive Communication About Safety

The interviewees were agreeing that safety often is communicated in a negative manner, and instead of gaining priority among construction workers it is seen as boring and annoying. An example brought up was that you always point out things that have gone wrong and you discuss them trying to prevent it from happening again. However, when tasks or situations are performed well you almost never hear about it. Some of the interviewees mentioned that the construction industry seems to be focusing on negativities, for example when the time frame or budget is overdue or when things have gone wrong. They were all agreeing that the construction industry is lacking positivism and positive criticism, which ends up in not encouraging good behaviours or performance. Encouraging good safety performance with positivism could according to the interviewees change the view on safety and improve workers attitudes towards safety and hence help increase the overall safety performance in a project.

“Unfortunately, safety is often discussed with negative attribute and all you hear about is when something has gone wrong. I think we generally need to become better at highlighting good solutions that have increased the safety or enabled us to work more safely”

- Site manager

“I think that we can be better at giving each other positive criticism, for example when someone has solved a problem in a good way. In general, I think that we in the construction industry are bad at encouraging good examples and when people have done something good”

- Senior executive

4.4.3 Forums for Knowledge Sharing

Several of the interviewees stressed that they wish for forums where safety could be discussed, and knowledge exchanged with other employees in other projects. They all agreed that the sharing of knowledge and experience are lacking between the employees and also between the projects. One interviewee described the projects as different islands with little to zero communication between each other. They argued that some problems would not even be problems if they were better at educating each other based on their own experiences and found solutions. Examples of how this sharing of knowledge might be carried out were to make more room for discussion during work environment meetings or to conduct meeting where the aim is to discuss and learn from

each other. Another suggestion was that the safety education courses are a great opportunity for knowledge sharing between different projects and thus more frequent courses could enhance this further.

“During the Work Environment and Safety meetings that we have regularly, where all site managers of the region are present, often the senior executives talk a lot and then we have about five minutes to discuss in the end. I would wish for more time and occasions to discuss and share experiences and knowledge with each other.”

- Site manager

“I would wish for a forum where you could discuss problems and solutions with other people in the same role as you, I think there is a lack of knowledge sharing between our projects and that we lose out on each other's experiences.”

- Foreman

“The safety educations are good and of course very important; however, I feel like the best thing with attending them is that you get to meet others in the same role as you and then you can exchange knowledge with each other.”

- Foreman

4.4.4 Involvement of Production in the Design Phase

Some of the interviewees mentioned that insufficient safety sometimes is due to lack of preparations and planning in the design phase. Situations when a task is to be performed but there are no instructions on how to do it in a safe and correct way, the site management together with the construction workers need to come up with ideas on how to do it and how to make it safe and adequate. When these kinds of problems occur, it affects the time frame and creates possible safety hazards. Furthermore, the interviewees argued that these kinds of problems could be avoided if production employees were involved earlier in the projects design phase, since they could contribute with construction technical knowledge and experience. Thus, a lot of unnecessary construction problems could be dealt with earlier by creating and plan for a safer design and way of constructing the building.

“I think that a lot of problems that occur during the construction phase, could be solved in advance if site managers, foreman, construction workers and subcontractors were involved earlier in the planning process of a project”

- Site manager

4.4.5 Job Satisfaction

All interviewees agreed that job satisfaction might play an important role in how willing someone is to comply with the safety guidelines and rules, and thus also comply with

the safety culture on the construction site. Multiple interviewees emphasized that satisfied workers are more likely to participate in safety precautions and care more about the safety on the construction site in general.

Furthermore, it was emphasized that stress plays an important role on job satisfaction and that reducing the stress on workers with tight deadlines might prove to have a positive effect on the safety culture. One of the studied construction sites stood out particularly in this matter. They have had problems with stress for a while which furthermore led to a higher rate of risk-observations than what is normal for the projects in the case organisation.

“I think that if you thrive in your workplace and with your colleagues, there is order around you and the work is going well, you are more likely to follow all rules and standards but also to reprimand people when they are not following the rules or are behaving badly.”

- Site manager

5 Discussion and Analysis

This chapter discusses and analyses the information presented in the literature study and the empirical study. The chapter begins with discussing the perceptions of safety culture on different projects levels in the case organisation and continues to discuss problems with safety culture, factors affecting the enabling of a unified and strong safety culture and ends with discussing thoughts and ideas that emerged during this study.

5.1 Perceptions of the Safety Culture on Different Project Levels in the Case Organisation

When analysing the answers to the interview questions formulated based on the Safety Culture Maturity Model by McGeorge et al. (2011) it is evident that the perception of the safety culture seemed to be quite similar among the interviewees. Most prominently but not surprisingly, the senior executives, site managers and foremen shared the same perceptions. Their perception of safety culture could easily be traced back as being in line with the company's desired safety culture that has been decided by the company executives. However, it is realistically grounded, and they notice that the company's desired safety culture is not always achievable in practice. The reason for the site managers and foremen to think like this is probably due to them having met challenges regarding the subject during their daily work. The senior executives also had previous experiences as foremen and site managers, so they have also encountered this problem throughout their years in the construction industry.

The subcontractor's perception of the safety culture isn't far away from the others and a possible explanation for this is that the subcontractor interviewees were managers in the subcontracted company and are not to be seen as a worker on the construction site. One of the interviewees even worked as a site manager for smaller construction projects carried out by the subcontractors, and thus he had encountered similar problems as the other interviewed projects levels.

However, everyone spoke about workers not always being compliant with the safety culture, and thus not sharing the same perception as the other project levels. All interviewees agreed that there is a difference in how some workers act when it comes to safety related tasks from what is desired from the main contractor. Which is a clear indication that there is a discrepancy in how they perceive the safety culture in the same way that is highlighted by Prussia et al. (2003), Guldenmund (2000) and Kecklund et al. (2014). It was mentioned that the workers didn't always have full awareness of the safety rules and guidelines, even though it is provided to them from several sources. Changes to safety rules and guidelines are communicated from the main contractor to the managers at the subcontractors and the interviewed managers at the subcontractors was keen to communicate it further to the workers on site. Indicating that the problems with subcontractors de-prioritising safety due to not having enough central resources or

not thinking safety is important enough, as mentioned by Halse et al. (2009) and Wadick (2010), is not present within case organisation.

Overall, the safety culture seemed to be good throughout the case organisation, and the interviewees continuously highlighted the importance of prioritizing safety. However, there were some indications that made it clear that this is not always fully translated into reality. For example, that it was unclear what risk-observations and incidents that needs to be reported or not. Some of the interviewees were more tolerant than others in this regard, even though they might be on the same project level. The same thing goes with how much the site management goes around and order people to follow the safety rules, some interviewees seemed to take this more seriously, while other seemed to be tired of it. Another thing in the same line is that stress and tight deadlines were mentioned as a cause for safety hazards. Which is contradictory, as safety was mentioned to be prioritized before time and money.

To conclude, the perceptions of the safety culture was similar between the different project levels of the interviewees, but that some differences could be noticed from one individual to another. However, regardless of which the interviewee was, everyone agreed that there sometimes are hard to get workers to comply with safety rules and guidelines, and thus, there is a gap between the perceptions of the safety culture among the workers and the project levels of the interviewees. The interviewees were keen to answer that safety always was the highest priority when asked the question directly. However, when asked indirect questions about the topic, there were some discrepancies and tendencies that safety always wasn't the top priority in practice.

5.2 Problems with Safety Culture

The importance of creating a strong safety culture to improve the overall safety performance in construction projects became highlighted both in the literature and in the interview study. Prussia et al., (2003), Guldenmund, (2000) and Kecklund et al., (2014) stressed the importance of organizations having a unified safety culture to improve the overall safety performance in construction projects, was also agreed to be the case by all interviewees. However, the difficulties of changing and improving the safety culture towards becoming stronger seems to be many. During this study it has emerged that there are no easy paths or shortcuts to take when working towards creating a strong safety culture. Richter and Koch (2002), Alvesson (1993) and Parker (2000) discusses the complexity of culture, hence safety culture, and applies it to the construction industry. The authors further emphasises that the complexity of construction projects is due to construction projects being temporary workplaces that are constantly changing and with multiple different people from different organizations that interacts for a certain period of time, during different phases of a project. Also, all different involved organizations have their own established safety culture going into the projects and therefore needs to adapt to the safety culture of the main contractors. Thus, several different safety cultures need to interact and create a unified safety culture

decided by the main contractor. Due to the variety and constant change in construction projects, together with the great number of people active, it seems to be impossible to come up with one solution to improve safety, adequate for every construction project.

However, the interviewees mentioned that they have witnessed a great change in the attitudes towards safety during the recent years, but they stated that there are still a lot that needs to improve to eradicating workplace incidents and accidents in construction projects, referring to the statistics presented by The Swedish Work Environment Authority (2022).

The overall encountered problems regarding safety performance of workers addressed by all the interviewees were laziness, taking shortcuts or using the excuse “I’m just going to...” when fixing a small thing, and also the attitude and mindset that “it does not happen to me...”. Further, several mentioned that it is easy to fall back into old patterns, hence instead of adapting to the new safety rules and standards you act as you always have. Furthermore, addressed by some of the interviewees was the lack of risk-assessment and deficient consequence thinking which some of them referred to the construction industry being male dominated and that men, especially younger men are lacking in these aspects. As discussed previously, and also mentioned in several of the interviews, was that it is very hard to keep track of everyone coming to and leaving the site since there is several actors active at the same time, some during a longer period of time and some only for a short time. The site managers mentioned that, especially for the ones performing shorter jobs, it is very difficult to monitor how they perform regarding safety since you simply do not have time or capacity.

Furthermore, Baarts (2009) addresses is the fragmentation and the formation of groups among workers out on construction sites and the fact that you don’t correct people outside of your group. Baarts discussed that it might be due to the fact that you do not care about people outside of your group or that you do not want to get into conflict with others. This was also emphasized by the interviewees, that the fear of conflicts or that you simply for not care about others safety performance as long as their actions won’t affect you, are main reasons to why you do not correct and report unsafe behaviours.

Throughout this study, it became evident that creating a strong and unified safety culture is complex and that there are no simple solutions. It also requires a lot of engagement and hard work since changing people’s behaviours do not come easy.

5.3 Factors Affecting the Enabling of a Unified and Strong Safety Culture

To cope with the challenges that have been discussed in the previous paragraph, the solution doesn’t seem to be to make the more rules and providing more information. The case company already have very detailed descriptions of how different tasks should be performed but yet struggling to create a strong and unified safety culture. Indicating

that even though rules and guidelines exist, they don't add much if they are not followed correctly, and if the views and importance of safety is not shared by the whole organisation. Not having a unified view on safety also leads to blame-casting between workers and managers as described by Prussia et al. (2003). This further implies that even though guidelines and rules are provided by the main contractor, workers will still blame the managers for not providing the correct equipment or conditions to perform the task in the desired way.

The following paragraphs will discuss factors that the main contractors can look towards to find possible areas of improvement. These areas include, *Encourage positive communication, Knowledge sharing, Increased engagement from site management, Language barriers, Job satisfaction, Procurement, and Long-term relationships with subcontractors.*

5.3.1 Encourage Positive Communication

Communication has throughout the literature been described as a central factor to create a unified safety culture. Kecklund et al. (2014), Törner (2011), Prussia et al. (2003) and Dejoy (2005) describes communication and leadership as important factors in establishing a strong safety culture. Further, the importance of involving everyone in the safety work through communication to promote a unified safety culture is emphasized by Prussia et al. (2001). Hence, communication has emerged as a main factor to enable the spreading and influence of safety culture. As main contractor the first step towards creating a unified safety culture together with subcontractor is to communicate your safety guidelines during the procurement, where being clear and strict about what rules apply is of great importance. Furthermore, it is important that the case company throughout their organization has communicated the determined safety culture and that the site management out on the project are well aware of how to work with safety. The site management are the ones in closest contact with the construction work hence their knowledge about the safety rules are of great importance to enabling the influencing of the construction workers. During the interviews the interviewees employed at the case company had the same overall perception of being well aware of the safety rules and guidelines. They described it as they always get informed when changes are made and if there are some situations that they need to pay more attention to due to possible safety risks. Hence, it could be concluded that there seemed to be no lack of communication within the case organization regarding safety rules and guidelines.

However, during the interviews the sense of safety communication often being in a negative manner emerged. The interviewees described that almost always when safety is discussed is when something has gone wrong or when you need to pay attention to certain situations due to high risk of it might going wrong. Also, during the meetings risk-observations and safety deficiencies are brought up, hence safety is discussed in a negative manner again and the lack of good examples or possible solutions of safety

problems are rarely discussed. Some of the interviewees expressed that the whole construction industry is lacking in promoting good examples where the safety performance has been of great quality. Further, also the way of threatening with fines if safety performance is lacking among subcontractor might increase the negativity surrounding safety. Kecklund et al (2014) describes that organizations aiming to develop its safety work need to focus on learn what the organization does good and not just focus on when the company are performing deficient. Fleming (2001) further support this and states that safety work shouldn't be driven by the fear of being prosecuted or other unfavourable situations, but rather it should be driven by the desire to prevent accidents and injuries for the benefit of the individual. Hence this further emphasizes the importance of changing the attitude towards safety and the choice of in which manner you communicate about safety. Thus, the mindset provided by Kecklund et al. (2014) and Fleming (2001) stresses that it might be one way to create a more positive attitude towards safety.

5.3.2 Knowledge Sharing

During the interviews the lack of knowledge sharing between employees and between project emerged as a deficiency within the case company. The different projects were described as own islands where only some of the knowledge gained during the project were further communicated to others. The interviewees stated that communication between for example site managers are to some extent up to themselves to enable and they stressed that forums promoting knowledge sharing are missing. Further, sharing knowledge and experience with others rarely comes with negative consequences, but rather the other way around. Hence the arguments for increasing and enable the knowledge sharing within the case company are many. Some of the interviewees argued that a lot of difficulties emerging during the projects could be avoided, or at least easier solved if the communication between site managements were further enabled by the organization. This also opens up for the discussion about involving production employees earlier in the design phase of a project. Since they are the ones in closets contact to the everyday construction work, the assumption of them possessing the greatest knowledge about construction in practice increases in credibility. Thus, knowledge sharing and to use the knowledge possessed by production employees would most likely result in decreasing problems occurring during construction, hence unforeseen problems demanding for quick solutions which endangers safety of the construction workers would decrease. Furthermore, one of the interviewed foremen mentioned the safety educations as a place for knowledge sharing and discussion with others within the same role. Hence the wish for more opportunities for that has gain in the foreman's interest. Thus, this also emphasizes the request for more opportunities to exchange knowledge.

Furthermore, during a participated work environment and safety meeting, where all site managers of the region and senior executives were present, the authors recognized that only a short time of the meeting were assigned to discussion between the site managers.

The majority of the meeting consisted of the senior executives talking about new solutions and rules that will be applied, which of course is of great importance, but more room for discussion should be considered. This proposal was further supported by the interviewees who witnessed that the discussion between the site managers is what provides the most to their everyday work and should earn more room in future meetings. The interviewed site managers argued that more room for knowledge sharing could help eradicate unnecessary problems and error recurrence. Thus, the idea of creating more forums for knowledge sharing and discussion about safety to enable creating a strong and unified safety culture gained importance.

5.3.3 Increased Engagement from Site Management

Another important part of communication is having an increased engagement from the site management. This was highlighted by multiple interviewees as something that could have a great impact on the overall safety culture on the construction site. As emphasised by Kecklund et al. (2014) an organisation could be viewed as a system of nodes, and that the interface between the nodes should be seen as a cause for poor safety cultures. One interface that are particularly important in the construction industry is the site management. As they are the ones present on the construction site and are in closest contact with the construction workers. Throughout the interview study, the interviewees mentioned several different factors that could improve the communication between the site management and the construction workers, such as; *being a role model, clear and consistent communication, establishing the culture early* and *presence on the construction site*.

Being a role model means that the site management should lead by example. The site management should not take shortcuts themselves and live by the safety culture the top management wants to establish in the organisation. Leading by example was also mentioned as an important management attribute by Kecklund et al. (2014) as it will affect the workers to act in a similar way. One obstacle with this is when the site management doesn't believe in the values themselves, but still has to communicate them to the construction site. As one interviewee mentioned, this could be the case with some new changes where the top management are seen as a little too 'unrealistic' in their ideas.

Clear and consistent communication means that site management should be direct in their communication and that it should not be contradictory. This implies that the safety communication should not be getting lower priority from one day to another based on the mood of the individual managers, as well as the communication should be similar from both the site managers and the foremen. From the interviews it was clear that this was not always the case as some managers mentioned that they sometimes got tired of telling people to do safety related things such as wearing the correct safety equipment. However, the problem with this is that when you let it go once or twice, it will create the norm that it is ok to not wear the correct equipment at certain times. The same thing

applies to when different members of the site management team values different actions differently, and thus does not correct the same deficient safety errors. Which is not desired and further adds to the discrepancy in perceptions of the safety culture between the workers and the main contractor.

Furthermore, the interviewees stressed the importance of *establishing the culture early in the project*. As it was mentioned, the safety culture is the most open to change during the early project phases and it is usually the first people on site that are the one forming the safety culture. This might mean that the site managers need to be more strict already during the early stages to establish the importance of safety in the project as it will translate into the later stages. Which may imply that workers that does not follow the rules and who have not better themselves after several warnings, get send home. Multiple site managers mentioned that this might be the way to go, even though it is not desired and that conflicts preferably are to be avoided.

Lastly, *presence on the construction site* emphasises the need for the site managers and foremen to go out on the construction site and observing how the work progresses, rather than spending most of their time inside the site office. This enables the site management to see what is going on out on the construction and makes it easier to monitor different safety factors. It further enhances the possibility to notice unsafe behaviours early and enables to create a constructive relationship with the workers. Relational leadership was emphasised by Törner (2011) to have better impact on the unification of the safety culture than ‘harder’ approaches to leadership, and thus being among the workers can benefit this further. The key here is, according to Törner, to promote cooperation, inspire, foster group goals and to provide support to work more safely. This will empower the worker to participate more in accident prevention and give them a sense of ownership of the safety work that is carried out. This might be seen as conflicting with establishing the safety culture by being stricter, but stricter and relational does not have to be seen as opposites. Instead having a relational leadership style and at the same time being strict will lead to the criticism being more constructive. As the two parties still respects each other and their relation.

A problem that was mentioned by the site managers was that they have a lot of responsibility and thus not always having the time to prioritize safety enhancing actions. Which further leads to less engagement in safety work. A way to cope with this is to have two site managers and to split the responsibility. In the project were the case organisation had two site managers, both of them mentioned that they had way more time to prioritize safety. Thus, relieving some responsibility from the site manager, for example by having two site managers, are an important enabler in order to facilitate an increased engagement from site managers in safety and safety culture. This would also enable site managers to put more attentions towards the site check-in, to make sure that everyone on the construction actually have read and understood the safety rules and standards.

5.3.4 Language Barriers

Prussia et al. (2003) stresses that everyone has to be involved in safety work if wanting to create a safe work environment in construction projects. This requires enabling everyone to be a part of the safety work and that the communication about the desired values, behaviours and attitudes regarding safety reach the whole organisation. During the interviews one of the senior executives mentioned that communication has become more difficult due to an increase of foreign subcontractors. He stated the fact that they need to hire foreign subcontractors due to the lack of Swedish contractors, thus, he stressed the difficulties with communication because of language barriers. Usually, the manager of the subcontractor knows English and, in some cases, Swedish, however that seemed to be more rare among the workers actually coming to the construction site. Hence, the importance of that their manager has provided them with the information needed to perform the assigned work and to follow the rules of the main contractor increases. Further, other interviewees also mentioned the difficulties in communication of, in this case, safety rules and standards if neither Swedish nor English is spoken by the workers, and that the importance of communication can become crucial during certain phases of the building process to avoid incidents.

These findings gave rise to the question about how many languages the main contractor needs to have their safety guidelines in. Since safety are such an important aspect and when deficient can cause severe problems, the importance of providing the information to everyone and be able to communicate when someone is behaving poorly regarding safety is major. Further, one senior executive mentioned that today they have their safety guidelines in around 10 languages, but still, that is not enough. This creates a discussion whether the main contractor needs to invest in translating their safety guidelines into all languages that they might be in contact with, or how the problem else can be solved. However, since mentioned during the interviews, that in the majority of the cases the manager of the subcontractor speaks English or Swedish one could argue that as main contractor you can require the managers of the subcontractor to improve their communication to their workers. Also, improving the safety performance of your workers might reduce the risk of being fined by the main contractor, reduce conflicts, improve the overall safety performance on the construction site, and thus improve the quality of work for the workers of the subcontractor. Furthermore, it should be of great interest of the managers of the subcontractor, however influencing them to realize the benefits needs to be further established. Another idea that emerged during the study was that the language barriers might be overcome by changing the way of presenting the safety rules. The thought of having the safety guidelines presented both in writing and in detailed pictures might possibly eradicate the language barrier problem to some extent.

5.3.5 Job Satisfaction

Job satisfaction was highlighted as an important factor to create a strong and unified safety culture by both the interviewees and previous research by Gyekye and Salminen

(2006; 2007). The interviewees emphasised that a satisfied worker is more likely to care about his or her workplace and the ones working around him/her. Which further translates into a care for the overall safety, less inattention to safety risks, and a higher degree of compliance with the safety culture.

Something that has a great effect on job satisfaction are stress and time pressure. Stress tends to encourage, or rather force, people into taking shortcuts which might include fewer safe options of performing certain tasks. One of the studied construction sites stood out particularly in this matter. They have had problems with stress for a while which furthermore led to a higher rate of risk-observations than what is normal for the projects in the case organisation. Which might lead to more incidents in line with Gyekye and Salminen (2007). Furthermore, the action of site management to turn a blind eye towards unsafe action or to actively encourage the use of short cuts due to time pressure, as suggested by Choudry et al. (2007), was not something that was found to be present in the case organisation. But the de-prioritisation of safety due to time pressure on the site manager, as discussed in 5.3.1.2, might have a similar effect and make them blind to unsafe actions to some extent.

One enabler to incorporate higher job satisfaction is to increase the support from top managers, which is highlighted by Prussia et al. (2003), Choudry et al. (2007), Gyekye and Salminen (2007) and Kecklund et al. (2014). Choudry et al. (2007) emphasised that top management should support workers from being forced into cutting by relieving them from time pressure. As one site manager mentioned, he had to pause a project because the time pressure was too high and endangered the workers safety. This proved to be the right decision and the deadline was revised. The site manager further added that this would not have been possible if he did not have the support from top management. Kecklund et al. (2014) also pointed out that another way for top management to show support is to provide sufficient staffing, good working hours and the correct safety equipment. Other ways to provide support for workers according to Gyekye and Salminen (2007) are by providing the right equipment, skill-training opportunities, job enrichment programs, visiting workplaces to alert workers of unsafe actions and openly expressing concerns for the workers safety.

5.3.6 Procurement

One of the first steps in this study was to gather information about how the case company communicates their safety rules and guidelines when establishing a contract with a subcontractor. Since the process of establishing a contract is where the main contractor can communicate their safety rules and guidelines and demand of the subcontractor to adapt to them, it is important to be clear and point out the importance of compliance with these rules. Through the information provided of the senior executives during interviewees and supervision throughout this study, information about how the procurement process works was provided and different contracts and statements of work environment rules were shown. After having taking part of this

information, one can conclude that the general information about how the main contractor expect subcontractor to perform regarding safety are presented. However, as the information being quite general a suggestion could be to include even more safety guidelines and to be more detailed in the description of safety work. In the interview with one of the senior executives it was mentioned that how safety is presented in the contracts leaves room for individual interpretation, which means that different people might perceive the safety rules in different ways, hence creating difficulties in unification of the safety culture.

Furthermore, also mentioned was that more focus needs to be put into discussing safety during the procurement and explain the importance of safety and that there are no other ways than following the safety rules set by the main contractor. This further leads to consequences if safety is not followed. The interviewees emphasized that if a subcontractor does not comply with the safety rules you should reprimand them, if there is still no change in behaviours you have the permission to fine them and finally to dismiss them from the construction site. The fine and rejection system is stated in the contract and the subcontractor has agreed upon it when signing the contract. Further, as main contractor when selecting subcontractors, it can be beneficial to choose subcontractors with similar views and values of safety to create a unified safety culture. Prussia et al, (2003) and Sekiguchi (2004) mentioned the selection of employees as a way of creating a unified safety culture, hence it would probably decrease the insufficient safety behaviours and hence the need of fines as well.

Also, the system of using fines to punish bad safety behaviours can be connected to the usually negative manner of communication of safety. Further, this emerged the idea of doing the other way around, meaning instead of only threaten to punish bad safety behaviours with fines, what if a financial reward to flawless safety behaviour also could be involved in the contract. Perhaps attract with a reward could reduce the negativity surrounding safety discussions and arouse the interest of safety of more people. Further brought up during several of the interviews were the involvement of production employees in the earlier phases of a project as a way of decreasing safety issues. Problems that occur during the production phase due to insufficiencies in the design phase could be avoided and also the establishment of a more unified safety culture could be done earlier and perhaps ease up the responsibilities of the site management to inform about the safety performance on site. This could be referred to as a partnering relationship and during this study the idea of partnering contracts as a way of tackling the difficulties with creating a strong safety culture has emerged.

5.3.7 Long-term Relationships with Subcontractors

Another thing that was found in the interview study was that experience with subcontractor is a factor affecting the safety culture. The interviewees pointed out that subcontractors that have had longer relationships with the main contractor over the course of multiple projects, are more in line with the safety culture than the

subcontractors with less experience with the main contractor. The interviewees employed by the main contractor also mentioned that new subcontractors are harder to get along with the safety rules and guidelines, as they already have their established way of working by working with other main contractors. This was also mentioned by the interviewed subcontractors as a difficulty as different main contractors have different sets of rules. Subcontractors with longer relationships know the safety procedures and guidelines on the main contractor's construction sites. Even though everyone performing work on the construction site are supposed to know the rules before coming to the site, this is not always the case, and it becomes more of a 'learn by doing'. Which explains why longer relationships tend to lead to better safety, and thus also, safety culture compliance.

It was also mentioned that subcontractors that are coming to the site to perform shorter jobs over a few days, does not seem to care to adopt to the safety culture. This further emphasises that longer relationships are preferable, which is something that are preferred by the case organisation as well. Thus, it is important with regards to creating a safer work environment to establish longer relationships between main contractor and its subcontractor.

5.4 Finishing Thoughts

During the interviews the main contractor's dependence of subcontractors was mentioned as a factor affecting how strict you are regarding safety compliance. Due to the project being in such a great dependence of the subcontractor in order to follow the time frame, the balance between safety and other factors is decisive for how strictly site managers are able to punish unsafe behaviour. Some interviewees mentioned that they think that it is easy to overlook bad safety performance in these situations, even though you consider safety to be of great importance, due to the pressure of the time frame and budget. This shows an example where safety allows to be deficient due to other factors being considered as more important in that moment. Construction projects rarely have room for changes in the time frame and that makes the dependence of the subcontractor even greater, hence the balance between keeping a subcontractor despite poor safety behaviour or rejecting them from the construction site becomes difficult.

To be able to overcome the difficulties with creating a unified safety culture in construction projects one of the senior executives mentioned that it probably will demand for more resources, thus people mainly focusing on safety needs to be established out on the projects. The case company are currently hiring people from other organizations to handle the logistics on site and to relieve workload from the site management. Further, an idea emerged of extending the responsibilities of this person to also be responsible of and monitor the work environment and safety of the construction site. This could also contribute to decreasing the stress among the site managers, who the majority of expressed lack of time as one of the decisive factors of

how much effort safety work are allowed to take, as well as putting safety on top of the list of priorities.

The future for the safety efforts in the construction industry looks bright and have found increased traction among construction practitioners over the last years. Safety is now a topic that is thought in school at both high-school and university, making more safety-conscious flow into the industry. However, it is important to keep improving and to keep question how to do thing even better. This way we might live up to the zero-injury vision sometime in the future.

6 Conclusion

Construction projects are highly characterised by fragmentation, with multiple different actors involved. These actors have their own established safety culture going into the project which makes it hard to get everyone to adapt towards the safety culture that is desired by the main contractor. Which is something that has been a challenge for the high-risk industry that the construction industry is. Especially, construction workers are hard to win over to the safety culture. Hence, the study aimed at investigating how main contractors can facilitate a unified safety culture in construction projects, and thus, encourage workers to actively think about safety.

The study discovered seven factors that are specifically important to create a unified safety culture, each with associated enablers. Namely, *Encourage positive communication, Knowledge Sharing, Increased Engagement From Site Management, Language Barriers, Job Satisfaction, Procurement and long term relationships with subcontractors*. By working with these factors, main contractors can facilitate a unified safety culture. However, challenges still arise with regards to the dependence that main contractors have with their subcontractors, which further adds to the complexity of creating safer construction projects. The problem here is that even though some workers from subcontractors does not act according to the safety guidelines, and that the dependence makes it hard for main contractors to act on this.

The results from this study can be used by main contractors to guide them towards making improvements in their safety culture. Some suggestions of enablers to reap the benefits of the factors are provided, but every organisation is unique and have their own problems regarding safety so it is up to each organisation to choose how they can make the best out of the findings. Furthermore, an important note is that in order to get benefits from creating a unified safety culture, it is important to have a good foundation of the desired culture that are to be shared by the organisation. Hence, before working towards unifying the safety culture, organisations should have a good safety culture to distribute. Otherwise, the benefits of having a unified safety culture will fall short.

The uniqueness and originality of the study in contrast to previous studies comes from studying multiple different construction sites with the same main contractor. This has enabled the study to find factors affecting unification of safety culture, that are beyond differences in cultures of different main contractors. Furthermore, the number of studies conducted within this topic is limited in Sweden. The Swedish construction industry has come a long way in their safety efforts, but there is still room for improvements. Which further emphasises the importance of research within the topic of safety and safety culture.

During the study, a few potential gaps in the research was encountered. Regarding the factors influencing safety culture that was found in this study, a few of them lacked coverage within the scientific literature. These topics include the relationship between

safety culture and the following areas; procurement, business relationships and knowledge sharing. Furthermore, this study only highlights important factors that affects safety culture, but not to what effect or extent that it does. This is also something that would be interesting to investigate further.

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