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Occupational Safety and Health in Small Construction Enterprises

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This study was initiated as a response to the need for more knowledge of occupational safety and health (OSH) in small enterprises in the Norwegian construction industry, and the purpose was to identify whether there needs to be a particular focus on these. The aim was approached by examining whether small enterprises differ from larger ones in terms of e.g. sick leave, health issues, working environment, and safety aspects; and what specific challenges small enterprises experience that should be prioritized regarding OSH. The findings are based on a combination of different data sources, including data on sick leaves, injuries, exposures, and health outcomes; interviews with key personnel in eight small enterprises and one larger enterprise; a workshop with central actors in the industry; and a review of existing research literature. The findings show that there are differences between small enterprises and larger ones when it comes to injuries, certain exposures, and health outcomes. Even though small enterprises often experience flexibility, closeness, and effective internal communication, specific challenges include the wide range of customers and project types; inadequacy of resources and competence on OSH; differing experiences with coordination, follow-up and involvement in large projects; and the importance of a common safety culture – both in projects and in the industry. The paper concludes that workers in small construction enterprises have high risk for certain OSH exposures and outcomes and therefore should be prioritized in future national safety efforts.

Keywords: Occupational safety and health, small enterprises, construction industry.

1. Introduction

1.1. *Background and research questions*

The construction industry is recognized as one of the most accident-prone industries in Norway, in terms of both occupational injuries and fatalities (Norwegian Labour Inspection Authority, 2023). Small enterprises represent a large proportion of businesses and employment in this industry.

This paper presents results from a project that was initiated by the industry program for construction under the agreement regarding a more inclusive working life in Norway (IA-BA).[a] One priority of the program has been to strengthen the focus on challenges of small and medium-sized enterprises. The main aim of the study was to provide recommendations as to whether, and how, small enterprises in the construction industry should be prioritized in the future work of the industry program. As a basis for evaluation, there was a need for more knowledge of occupational safety and health (OSH) in small construction enterprises. This was addressed through the following two research questions:

- Do small enterprises differ from larger ones in terms of e.g., sick leave, health issues, the working environment, and safety aspects?
- What are the specific challenges faced by the small enterprises?

1.2. *Definitions and terminology*

Occupational Safety and Health (OSH) can be defined as "a practice that deals with the safety, health, welfare and wellbeing of people when they are at work".[b] The Norwegian term (i.e., Helse, miljø og sikkerhet, HMS) encompasses all

[a] IA bransjeprogram for bygg og anlegg

[b] What is occupational health and safety? | British Safety Council

aspects of health, environment and safety at work, and it is described in the Regulations relating to Systematic Health, Environment and Safety Activities in Enterprises (short: Internal Control Regulations).[c] In the context of this study, OSH refers to the challenges and needs related to exposures, health issues, sick leave, and safety.

'Small enterprises' is a term for which there is no common, universal definition. In Norway, enterprises with less than 100 employees are commonly referred to as Small and medium-sized enterprises (SMEs); small enterprises being those with up to 20 employees. In this study, focus has been on the latter. An implication is that a lot of the international literature on SMEs, which often include enterprises with up to 250 employees, is not always relevant.

1.3. *Structure of the paper*

The rest of the paper is structured as follows. Chapter 2 describes the material and methods. Findings related to the first and second research questions are presented and partly discussed in Chapter 3 and 4, respectively. Chapter 5 rounds off the paper with a discussion of the findings and a conclusion.

2. Material and methods

The findings presented in this paper are based on several data sources. We have extracted *data* on sick leaves, injuries, exposures and health outcomes from various sources, analyzed them using Excel, compiled and summarized them. This includes selections created from the StatBank Norway[d] which is provided by Statistics Norway (SSB). It further includes ordered extracts of data from the Norwegian Labour Inspection Authority, the Norwegian Labour and Welfare Administration (NAV) and The National Institute of Occupational Health in Norway (STAMI).

Empirical data was collected through *semi-structured interviews* with nine people from eight small enterprises working in various parts of the construction industry. The informants represented one sole proprietorship, one enterprise with 6-7 permanent employees, five enterprises with 12-22 permanent employees and one enterprise with approximately 30 permanent employees. The enterprises differed in terms of the number of administrative positions as well as the use of hired labor. The interviews dealt with the following topics: The general experience of being a small actor in the construction industry, specific challenges of small enterprises, suggestions for how to improve the situation for small actors, as well as questions regarding inclusion and involvement in large projects. In addition, one interview was carried out with a large contractor. All interviews were conducted as video-meetings using Microsoft Teams.

Close to the end of the project, a *workshop* gathered 17 experts representing key stakeholders in the construction industry (i.e., contractors, clients, authorities, design consultants and workers' organizations) and three researchers. The purpose was to validate preliminary findings from the study, to obtain more knowledge of certain topics, as well as discussing how the industry can work together to improve the conditions for small enterprises. In addition to a presentation by the researchers, the workshop included presentations by several of the industry stakeholders, as well as group discussions and plenary sessions.

What is more, a *limited literature review* was conducted to address the research questions. Literature was obtained through searches in the interdisciplinary database Scopus, using a range of specific search terms related to the key concepts 'small enterprises', 'construction' and 'occupational safety and health'. Similar searches were carried out using Google to find relevant reports, student theses etc. The review resulted in a relatively limited number of publications that were considered of relevance to this study. The obtained literature was used to support or question findings from other sources.

The empirical data was analyzed through a *thematic analysis*, resulting in some central topics describing benefits and challenges of small construction enterprises and recommendations for improvement.

[c] Regulations relating to Systematic Health, Environment and Safety Activities in Enterprises (Internal Control Regulations) - Lovdata

[d] StatBank Norway – SSB

3. Enterprise size and OSH factors

Based on findings from the literature and statistics on OSH factors, this chapter addresses the first research question: *Do small enterprises differ from larger ones in terms of e.g., sick leave, health issues, the working environment, and safety aspects?*

3.1. *Sick leave*

One factor that says something about the OSH condition in an enterprise is the sickness absence rate for its employees. A comparison was made of statistics on doctor-certified sick leave in construction registered enterprises of different sizes (in terms of the number of employees). The percentage is calculated as the ratio between lost days and the total number of planned working days. Both when looking at the numbers for 2022 from SSB and when looking at the average numbers for the period 2017-2021 from NAV, larger enterprises have a slightly lower sick leave rate than the smaller ones.

3.2 *Occupational injuries*

There is a widely shared perception that incidents rates found in small construction enterprises are higher than the ones in larger enterprises (e.g., Al-Bayati 2021; Hasle et al. 2012; McVitties et al. 1997). According to Pedersen et al. (2011), statistics from different countries indicate that the risk of occupational injuries among construction workers decreases with increasing enterprise size. The authors do, however, point out that none of the studies that the statistics are built on have been evaluated with respect to the distribution of professions. For instance, it is very common that small enterprises are subcontractors or sub-subcontractors. This often implies being involved in execution of the work in the sharp end; thus, being more exposed to different risk factors.

Numbers from SSB on reported accidents to NAV in 2021 and the number of employees based on a reference month of the same year, indicate that the likelihood of occupational accidents is smallest in small enterprises (<5 employees), with the highest accident rates in enterprises with 100-249 employees. However, according to STAMI (2021) there are several limitations to the statistics based on accidents reported to NAV, including significant underreporting of accidents as well as sole proprietorships rarely being a part of these figures. We believe that the number of dark figures is greater among small enterprises than larger ones. A source that we find more reliable is the Labour force survey (AKU). It was carried as phone interviews by SSB in 2020 and reported by the Norwegian Labour Inspection Authority (2022). The informants were asked whether they had been physically injured due to an accident at their workplace or when carrying out the work during the last 12 months. The interviewees, which constituted a representative, nationwide sample of the population, included about 1100 people working in the construction industry. According to this survey (see Table 1) the injury rate is clearly the highest among employees in small enterprises (i.e., with 1-10 employees).

Table 1. Percentage of interviewees reporting to have been physically injured in a work accident during the last year. Source: AKU 200/SSB; Norwegian Labour Inspection Authority 2022.

Enterprise size (no. of employees)	Occupational injury rate
1-10	7.7 %
11-49	4.9 %
50-199	6.0 %
200+	5.2 %

As can be seen from these numbers, the injury rate for enterprises with 11-49 employees is relatively low. The numbers do not, however, provide information about the distribution within each of these groups, e.g., if there is a difference between those with 11-20 employees and the rest (21-49 employees).

Holte et al. (2015) used a survey to study the relationship between enterprise size and the occurrence of injuries among apprentices in the construction industry in Norway. In general, they found that the rate of injuries was higher in enterprises with 10-19 employees. However, further analyses indicated that there are distinct differences between different professions, and the authors underpin the importance of evaluating the nature of the work and the related exposures, as well as other characteristics that might vary with enterprise size.

3.3 *Work-related fatalities*

Based on numbers from the Norwegian Labour Inspection on work-related fatalities in which the

employer is registered with construction as its main industrial area (i.e., industrial code), there were a total of 46 work-related fatalities in the Norwegian construction industry in the period 2016-2022. Table 2 shows the prevalence of fatalities in terms of fatalities per 1000 employees for the whole seven-year period within enterprises of various sizes.

Table 2. Work related fatalities (2016-2022) per 1000 employees (reference month Nov 2021) Source: Norwegian Labour Inspection Authority; SSB.

Enterprise size (no. of employees)	Work related fatalities (2016-2022) per 1000 employees
1-4	0.15
5-9	0.19
10-19	0.05
20-49	0.21
50-99	0.33
100-249	0.12
250+	0.39

When grouping these in terms of "small enterprises" (1-29 employees) and "larger enterprises" (20+ employees), the figures are 0.12 and 0.25, respectively. This indicates a higher risk of work-related fatalities in enterprises with more than 20 employees. It is, however, important to note that this distribution is based on a small number, and that it has not been evaluated with respect to other factors such as professions, etc. One hypothesis worth considering is that there is a difference in the distribution of enterprise sizes between the building sector (e.g., building houses and commercial buildings) and the construction sector (e.g., construction of roads, railways, bridges and tunnels), and that the fatality rate within each of the sectors also differs. Further analysis is necessary to explain the figures from Table 2.

3.4 *Exposures and health outcomes*

STAMI has provided an overview of a range of different indicators of exposures and health outcomes for the construction industry based on the Living Conditions Survey conducted by SSB in 2019. The indicators are related to the physical working environment, the psychosocial and organizational working environment, and the chemical and biological working environment. A small sample of the indicators that are indicative of differences between enterprises of various sizes, are presented in Table 3.

Table 3. Exposures and health outcomes (percentages of respondents) by enterprise size. Source: STAMI.

Indicator	No. of employees		
	>10	10-49	50+
Conflicts (colleagues, customers, leaders)	14.0	20.0	25.0
Role conflicts	5.0	8.4	11.0
Work demands disturbing personal life	18.0	9.8	9.8
Downsizing	3.8	15.0	20.0
Reorganization	3.5	16.0	20.0
Heavy lifting (>20kg)	51.0	40.0	34.0
Heavy work (physical)	40.0	30.0	30.0
Working in a standing position	39.0	32.0	27.0
Skin contact with chemicals	45.0	38.0	35.0
Seeing/smelling organic dust	16.0	13.0	7.3
Work-related arm pain	23.0	15.0	9.7
Work-related neck and shoulder pain	34.0	20.0	19.0
Work-related musculoskeletal pain	51.0	42.0	36.0
Work-related mental health disorders	8.9	11.0	8.6
Experienced risk of injury	31.0	30.0	27.0
Work-related sick leave	6.1	6.0	6.3
Envisions working until retirement	23.0	15.0	13.0

In general, these numbers indicate a somewhat better psychosocial working environment in small enterprises. Employees in small enterprises are, however, more exposed to mechanical, physical and chemical exposures. Based on these numbers, work-related health issues are also more prevalent among those working in smaller construction enterprises. A more detailed description of the various indicators can be found in the fact book

on work environment and health 2021 by STAMI.[e]

In terms of psychosocial work environment, these findings align well with a mapping that was carried out among Norwegian enterprises in different industries, showing that small enterprises experience fewer risk factors related to the psychosocial work environment, e.g., high job demands, lack of feedback, insecurity related to changes, poor work-life-balance, etc. (Thun et al. 2022).

In 2013, The Norwegian Labour Inspection Authority conducted a condition survey for the construction industry. It found that workers in enterprises with ten or fewer employees are more exposed to organic dust, gases, steams, mineral dust, cold, mechanical factors and vibrations, as well as reporting more working hours a week, than workers in larger enterprises.

4. Challenges experienced by small enterprises

This chapter primarily presents findings related to the second research question: *What are the specific challenges faced by the small enterprises?* These are based on the interviews and the workshop and are complemented with some literature findings.

There are many factors influencing OSH for small construction enterprises and several interviewees were, in fact, quick to mention the advantages that come with being a limited number of employees. A common statement was that "everybody knows everybody" and some described it as being part of a family. A potential positive effect is that workers can find it easier to inform about personal matters that may affect their work; and that it is easier for managers and colleagues to recognize when an individual is struggling in some way, and take this into consideration, e.g., when dividing work tasks. In other words, the size of an enterprise may have some influence on its openness culture. The downside, however, might be that unpopular decisions are even harder to make, as you feel that you are letting close ones down.

Another positive side to being smaller is the clear perception among the interviewees of shorter lines of communication, especially between the people working out on the site and the person(s) working in the office. Also, the level of responsibility in the sharp end is said to be higher in small enterprises where you do not typically have several leaders onsite. Finally, some argue that working in a small enterprise often entails more flexibility, holding that larger enterprises feel more rigid.

Specific challenges related to being a small construction enterprise are described in the following subchapters.

4.1. *Variety in clients and projects*

Informants mention that several of the smaller enterprises in the industry work for very different clients on a wide range of projects. This is challenging to many, as they must continuously adapt to varying demands and expectations from clients with very different knowledge of and competence related to safety and health. The prizing of safety measures was mentioned as one such issue. One informant clearly stated that if he had the opportunity to choose, he would work for professional clients only.

Even though many small enterprises are subcontractors on large projects, small projects are a more common part of the work life for most small actors. Small projects are, by some, associated with less systematic OSH work as it is time consuming. What is more, working on projects in densely populated areas, which is often the case when building houses, was described as stressful due to conflicts with existing neighbors. Having to deal with such conflicts may become time consuming, and there were examples of workers having raised concerns about being onsite without the client being there to answer on behalf of the project.

4.2. *Lack of resources and competence of OSH in small enterprises*

Two challenges that were emphasized during the workshop were insufficient resources in many small enterprises to prioritize OSH work and a lack of necessary competence to do so. It was argued that several small enterprises do not fully acknowledge their employer responsibilities in projects as outlined in both the Internal Control Regulations and the Working Environment Act.

[e] Faktabok om arbeidsmiljø og helse 2021. Status og utviklingstrekk - STAMI

The workshop participants describe how many small enterprises do not have leaders present on the construction site, and that there is also a problem of them not reporting incidents and unsafe conditions. Some believed it to be mostly about the lack of competence and tools, whereas others suggested an imbalance between focus on production and focus on OSH matters.

Almost all the interviewees stressed the importance of keeping things in order, especially regarding internal control. They acknowledged the necessity of being perceived as a serios actor by the larger contractors in the industry, and that this is of utmost importance to win subcontracts. In their opinion, however, the main problem is that all companies are obliged to comply with the same "paperwork requirements" regardless of having two employees or 100. Some question the balance between documentation requirements and the size of the job that is to be performed in a project. While larger companies have dedicated OSH personnel in full-time positions, the smallest companies cannot afford to hire someone to do this job. For most, this means that health and safety matters become a task for the managing director or other administrative personnel to perform on top of other work. Hence, the lack of resources making it difficult to comply with health and safety regulations is described as a central challenge also by the informants from small enterprises.

Large projects typically involve larger contracts for several of the small enterprises than small projects and are thus crucial for their profitability. At the same time, larger projects are often also associated with larger financial risk. As these projects are more complex and involve more actors over a longer period, they can also be more unpredictable in terms of progress. As small enterprises are often involved in a limited number of projects at the same time and for that reason cannot simply move people between different projects, it was suggested by an interviewee that project delays tend to affect small enterprises more negatively than larger ones. This type of uncertainty can be stressful to workers.

The obtained literature coincides with findings from the interview and the workshop. A master's thesis by Nilsen, Ørjebu and Ørsjødal (2016) shows that the safety work of small and medium-sized enterprises in the Norwegian construction industry is characterized by their flat organizational structure and limited financial resources. It was also found that informal systems for internal control and OSH tasks in general lead to challenges to comply with regulations and client requirements, and it is stated that it is in the interface between the different actors that the problems related to small and medium-sized enterprises manifest. Another finding from the thesis is that main contractors tend to cover up the lack of appropriate systems by incorporating subcontractors into their own internal control system. As a possible consequence, small enterprises may lack experience, which may in turn affect their ability to perform according to regulations when working as main contractor for inexperienced clients (ibid.).

Holte and Kjestveit (2012) performed a qualitative case study exploring how young construction workers are received at their workplace with regards to OSH training. Their study, which was based on 11 young workers in seven enterprises of different sizes, found that the larger enterprises have more formalized routines and systems for receiving and training young workers. However, the authors hold that the routines were more dependent on requirements set by legislators and contractors than by company size.

4.3. *Coordination, follow up and involvement in large projects*

Clients and main contractors are to a large degree responsible for the premises for OSH in projects. Findings from the workshop indicate that insufficient coordination by the main contractor is a common problem in large projects. Due to limited resources and lack of competence on OSH, many small subcontractors rely on active follow up. It can be challenging for them to deal with regulations, systems, procedures and routines, and differences in rules and systems introduced by various clients and main contractors make it even more demanding.

It is important that the clients' plan for safety, health and environment is adapted to the specific project and that subcontractors are familiar with this plan and involved in project risk management. Hence, involvement is key to good cooperation and follow up in projects. According to findings from the workshop, however, small subcontractors are rarely involved in early cooperation and interaction.

The interviewees have different experiences when it comes to degree of involvement and follow up by the main contractor. Several emphasize the importance of trust and experience as well as personal relationships. Although some have mostly good experiences, others claim that things become more cumbersome and less efficient when there are very large contractors leading the project. One stated that "the larger the contractor, the worse".

Another side of this challenge relates to the main contractor's lack of knowledge about the work that is performed by the subcontractor. As an example, one may be required to perform a Safe Job Analysis (SJA) on a task that has already been risk evaluated and that is considered a standard job that is carried out regularly. Other challenges that have been mentioned by the interviewees and workshop participants include differences in how OSH is handled in the contract and how it is handled in practice and the client being too distant.

4.4. *Safety culture – in the project and the industry*

The informants from small enterprises emphasize the importance of employees being taught to maintain the safety of oneself and others: "Everyone should get home safely from work". It is also stressed that everyone must report incidents and unsafe conditions to spread awareness. Such practice requires openness regarding one's own experiences to promote collective learning. Even more importantly, it requires that a general focus on work environment and safety is encouraged – not just in a specific project or organization, but in the industry.

Despite a common desire among the informants for a good safety culture, several explain how things often go wrong due to conscious and unconscious shortcuts that introduce unnecessary risk. One informant uses the term "cowboy mentality" to describe the mentality and attitude among many individuals in the construction industry who wants to be perceived as "tough". He further specified that these "cowboys" are not only found among the workers in the sharp end, but also in other parts of the project hierarchy, and that these individuals affect the overall culture in the industry. More specifically, some have experienced main contractors leaving particularly risky tasks to small subcontractors; ruining the idea of a shared safety culture for the project.

According to one of the articles from the literature review, there is a positive correlation between enterprise size and safety culture within the construction industry, where safety culture is represented by safety related actions in top management and safety personnel (Al-Bayati 2021). The same study showed, however, no statistically significant relationship between enterprise size and safety climate, represented by safety related actions by first-line managers and employees. A study from New Zealand by Guo, You and González (2018) showed that employees in larger companies provided significantly higher scores on the management's commitment to safety work, social support and safety motivation than employees in smaller companies.

Sunindijo (2015) presents barriers that small enterprises meet in relation to safety work. Among these barriers are client demands and poor safety culture. The first is about the competitive nature of the construction industry leading to economic considerations often being prioritized over safety considerations. As there are typically many small actors operating in the same market, this gives the client power over the small enterprises. This can result in a concern that actors trying to prioritize safety performance are being punished if this results in a higher prize. This coincides with information from the interviews. The study further shows that poor safety culture in small enterprises is a result of owners and leaders being preoccupied with more urgent demands by the client (ibid.).

5. Discussion and conclusion – What can be done to improve the conditions for small enterprises?

Most of which is previously published about small enterprises relates to SMEs, also including much larger companies than the ones focused on in this study. This paper thus contributes to a better understanding of OSH risks and challenges faced by the smallest enterprises in the Norwegian construction industry.

There are several reasons why small enterprises should be prioritized in future safety efforts. Small enterprises make up a relatively large proportion of the industry's actors. Findings from this study indicate that small enterprises have higher injury rates than larger ones, and that

they are more exposed to mechanical, physical and chemical exposures and work-related health issues. What is more, there are few measures in the industry that specifically aim to improve the OSH conditions for small enterprises.

Hence, there is a great potential for a "lift" in the OSH condition amongst small enterprises in this industry, nationally. These include ensuring competence of and resources for OSH in these enterprises; that managers have competence in OHS and lead by example; good framework conditions for small subcontractors in large projects; more common framework conditions for small enterprises in the industry and good involvement and coordination in projects.

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