



The Working Environment of the Future

Digitalization and OSH
Challenges in the Nordics



Nordic Council
of Ministers

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Sigurd M. N. Oppegaard (Ed.)

Mona Bråten

Johanne Stenseth Huseby

Kristin Jesnes

Stine Rasmussen

Laura Seppänen

Sondre Thorbjørnsen

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Summary

This TemaNord report explores occupational safety and health (OSH) risks and working environment challenges associated with the digitalization of work across different forms of employment. It looks specifically at the interaction between digitalization and workers' employment status. These are areas that have been identified as a particular challenge for the Nordic labour market models. The report is based on a Nordic research project bringing together researchers from Denmark, Finland and Norway to study digitalized work arrangements in different industries and explore and identify potential OSH risk factors. The project has been funded by the Nordic Working Environment Committee under the Nordic Council of Ministers and coordinated by Fafo Institute for Labour and Social Research.

The analyses are based on and combine different data sources: 1) reviews of existing research literature, 2) five empirical case studies and 3) workshops with the Nordic labour inspectorates. The chapters study how new technologies, work arrangements and non-standard forms of employment create new and heighten work environment challenges. To this end, the analyses are particularly interested in platform-mediated gig work as a digitalized work arrangement usually involving non-standard employment models. However, they also emphasize how new OSH risks interact with and potentially exacerbate existing labour process- and industry-specific work environment challenges. In addition to advancing the empirical knowledge of the effects of digital technologies on OSH and work environments, the report develops a risk factor framework that identifies OSH risk factors associated with the digitalization of work across different forms of employment.

Chapter 2 discusses occupational safety and health and working environment challenges associated with atypical forms of employment and digitalization based on previous research. It provides an in-depth assessment of the literature on field technologies, non-standard forms of employment and platform-mediated gig work and highlights the work environment challenges emerging from these technologies and work arrangements. The risk factors are linked to new forms of control, managerial systems characterized by opacity and unpredictability and inadequate OSH regulations and enforcement. Nonetheless, the OSH hazards workers face are not solely a result of new technologies or non-standard forms of employment; the review shows that labour process- and industry-specific features remain important. Such risks, however, can be heightened by the introduction of new technologies.

Chapter 3 explores platform-based cleaning services in Norway. It draws on a desk study and qualitative interviews to map working environment challenges associated with digitalized work arrangements in the Norwegian cleaning industry. The chapter investigates the platform company Vaskehjelp in particular, differentiating the platform model in the cleaning industry from other established work arrangements. The analysis shows that the platform model, which gives significant power to customers through the rating system, creates unpredictability in terms of work opportunities for cleaners, and that time management and stress are important work environment challenges facing cleaners. While working for digital platforms, the cleaners, furthermore, are still exposed to the OSH challenges that characterize the traditional cleaning industry, risks that can be exacerbated by the platforms' employment model: Since the cleaners working for the platforms tend to be classified as self-employed contractors, they are generally not covered by the rights and protections that usually follow an employment relationship.

Chapter 4 analyses the case of Happy Helper, a domestic cleaning platform in Denmark. It is based on interviews with cleaners and management representatives, in addition to relevant documents, and finds that working for cleaning platforms can be economically insecure, physically demanding and mentally stressful. Furthermore, cleaners can feel isolated and invisible, inhibiting collective mobilization. They are exposed to both industry-specific OSH challenges and challenges emerging from the digitalized work environment, such as how much time the cleaners are allocated per task and their dependence of favourable evaluations from costumers. While they have a significant flexibility, the cleaners are under significant time pressure and often work overtime. Since they rely on positive customer reviews, the analysis shows, it can also be difficult for platform-based cleaners to require that the customer provide them with sufficient equipment.

Chapter 5 compares platform-based food delivery work in Denmark and Norway, analysing the case of Foodora, Just Eat and Wolt. It investigates the working environment challenges couriers face, in particular from the platforms' algorithmic management. The chapter finds that in addition to being physically demanding and mentally exhausting, the couriers' working environment is characterized by three main OSH risks: job and income insecurity, waiting time and time pressure, and harassment and unfair treatment. While these job characteristics are a result of the food delivery platforms' algorithmic management and intraplatform algorithmic change, the effects are conditioned by the couriers' employment model.

Chapter 6 also analyses platform-based food delivery, exploring the Finnish case through qualitative interviews couriers. The chapter investigates transparency, opaqueness, autonomy and agency as key features of platform-mediated gig work and platform workers' work environment. It argues that while couriers are attracted to platforms by the flexibility and autonomy these work arrangements offer, they are also monitored and evaluated by the platforms practices that limits

their actual flexibility and autonomy. The chapter also shows how the couriers' autonomy and agency is both enabled and inhibited by the transparency and opaqueness of the platforms' arrangements: Certain aspects of the operation are made visible to the workers, allowing them to make informed and autonomous decisions, while other aspects remain opaque, creating both unpredictability and stress. It thus illustrates that the digitalization of work does not necessarily entail opaque forms of control but can also, under certain conditions, enable increased transparency. Although the platforms' operations might be opaque, workers develop an understanding of how they function, enhancing their agency potential, giving rise to complex dynamics of transparency, opacity, autonomy and control.

Chapter 7 concludes this report by developing and presenting a risk factor framework for occupational safety and health, digitalization and forms of employment. The framework is based on the scoping review published at an earlier stage of this project, relevant international research, the empirical case studies and workshops with the Nordic labour inspectorates. The framework aims to show how OSH risks can be articulated through digitalization and across different forms of employment. It identifies and discusses seven risk factors: isolation, deskilling, worker turnover, piece-rate precarity and stress, reduced autonomy, control and surveillance and increased OSH fragmentation. The chapter also highlights regulatory challenges associated with occupational safety and health for the future of work in the Nordic countries.

Chapter 1

Introduction

Sigurd M. N. Oppegaard (Fafo)

While work is key to good health and well-being (ILO, n.d.; WHO, 2017), it can also be dangerous. According to the ILO's estimates, work-related factors led to the death of 2.93 million workers and non-fatal injuries in 395 million workers across the world in 2019 (ILO, 2023; Takala et al., 2023). Regulating how work is conducted is therefore essential in social systems based on the buying and selling of labour power (Abrams, 2001). Risks, working environment challenges and occupational safety and health hazards vary across different types of work, labour processes, organizations, work arrangements and forms of employment. Hence, new forms of work, new technologies, new business models and new ways of organizing work might create new occupational safety and health risks for workers, as well as regulatory challenges for lawmakers (Foldal et al., 2023; Nielsen et al., 2022; Papadopoulos et al., 2009).

In the current debates on the "future of work", much attention has been paid to how technologies such as automation, robotization and artificial intelligence will affect the demand for labour power and how they will affect the occupational structure (see for example Frey and Osborne, 2017).^[1] Technology, however, is only one of multiple factors that affect the future of work and labour markets (Rolandsson and Dølvik, 2021). It also interacts with and is contingent on the legal and regulatory, social, cultural and economic conditions under which it is implemented. It is therefore important to examine both how the quantitative effects of technology on work vary across countries and industries and the qualitative effects of technology on how work is conducted and organized (Rolandsson et al., 2019). This is also the case for the future of occupational safety and health at work (Foldal et al., 2023).

To this end, this report explores risks and working environment challenges associated with the digitalization of work across different forms of employment. We look specifically at the interaction between digitalization and workers' employment status, areas that have been identified as a particular challenge for the Nordic labour market models (Nordic Council of Ministers for Labour, 2023). The research project and this report bring together researchers and cases from Denmark, Finland and Norway to study digitalized work arrangements in different industries, discussing "analogue" as well as "digital" occupational health and safety

1. For a discussion of these debates and the "automation discourse", see Benanav (2019a, b).

hazards. We are particularly interested in platform-mediated gig work as a digitalized form of work often involving non-standard forms of employment (van Doorn, 2017; Woodcock and Graham, 2020). While platform-mediated gig work remains relatively marginal in the Nordic countries at the aggregate level of the labour market (Alsos et al., 2017; Jesnes and Oppegaard, 2020; Kristiansen et al., 2023), this form of work has become a key actor in certain service industries in the Nordic countries, in particular the food delivery, domestic cleaning and taxi industries (Alasoini et al. 2023; Andersen and Spanger 2024; Hau and Savage 2023; Ilsøe and Söderqvist 2023; Jesnes and Oppegaard, 2020, 2023; Mbare 2023; Newlands 2021; Valestrand and Oppegaard, 2022).

In some cases, new technologies can contribute to improving safety and health at work (see Christensen et al., 2020). From an OSH perspective, such potential is important and must be monitored. This project, however, aims solely to explore and identify potential OSH risk factors associated with digitalization across different forms of employment. We do this through three analytical strategies. First, we have conducted a scoping review of the existing literature on work environment challenges associated with digitalization and non-standard work (Bråten and Thorbjørnsen, 2023). Second, we have conducted five empirical case studies of digitalized work arrangements in the cleaning industry and food delivery industry in Finland, Denmark and Norway. These case studies advance our empirical knowledge of the effects of new technologies, new work arrangements and different forms of employment on OSH. Third, based on previous research and our own empirical case studies, we have developed a risk factor framework (Thorbjørnsen and Oppegaard, Chapter 7). This framework identifies occupational safety and health risk factors associated with the digitalization of work across different forms of employment. In addition, we organized two project workshops where we presented and discussed our findings and analysis with representatives from the Nordic labour inspectorates. The project has been funded by the Nordic Working Environment Committee under the Nordic Council of Ministers and coordinated by Fafo Institute for Labour and Social Research.

1.1 Structure of the report

This report is concerned with the last two analytical strategies, namely the five empirical case studies and the risk factor framework. It proceeds as follows: In the next chapter, [Chapter 2](#), Sigurd M. Nordli Oppegaard (Fafo, Norway) and Mona Bråten (Fafo, Norway) discuss theoretical and regulatory approaches to occupational safety and health. The chapter looks specifically at OSH challenges associated with atypical forms of employment and digitalization, reviewing the literature on field technologies, non-standard forms of employment and platform-mediated gig work. The chapter shows that there are important work environment challenges associated with all three reviewed aspects of the future of work. These

risk factors are linked to new forms of control, managerial systems characterized by opacity and unpredictability and inadequate OSH regulations and enforcement. Nonetheless, the OSH hazards workers face cannot be viewed solely as a result of new technologies or non-standard forms of employment; labour process- and industry-specific features remain important, although such risks can be heightened by the introduction of new technologies.

In [Chapter 3](#), Johanne Stenseth Huseby (Fafø, Norway) explores platform-based services in the Norwegian private cleaning industry. The chapter uses a desk study and qualitative interviews with cleaners, representatives of unions organizing cleaners, a safety representative and a representative from the industry's tripartite sector programme to map working environment challenges associated with digitalized work arrangements in the Norwegian cleaning industry. Huseby investigates the platform company Vaskehjelp in particular, differentiating the platform model in the cleaning industry from other established work arrangements such as traditional cleaning companies, independent and self-employed cleaners and "hybrid" cleaning companies. The analysis shows several things: First, the platform model, which gives significant power to customers through the rating system, creates unpredictability in terms of work opportunities for cleaners. Second, time management and stress are important work environment challenges for cleaners, who must complete the tasks they are allocated within a time frame set by the customer, whose assessment can have significant impact on the cleaners' future income. Third, cleaners working for digital platforms are still exposed to the OSH challenges that characterize the traditional cleaning industry, such as lone work and chemical and ergonomic work environment hazards. Since cleaners working for the platform companies might not be required to go through the same training as traditional cleaners, these risks might be exacerbated by the platform model. Fourth, since the cleaners working for the platforms tend to be classified as self-employed contractors, they are generally not covered by the rights and protections that usually follow an employment relationship. This can be an OSH risk factor – heightened by the industry's reliance on foreign-born and migrant workers who might lack knowledge about the industry and the legal and economic consequences of self-employment. Thus, Huseby's chapter shows that cleaners working for platform companies are not only exposed to the work environment hazards that long have characterized the cleaning industry, but also face additional risks that follow from digitalized work arrangements and non-standard forms of employment.

Similarly, Stine Rasmussen (Aalborg University, Denmark) analyses the case of Happy Helper, a domestic cleaning platform in Denmark, in [Chapter 4](#). The analysis is based on interviews with cleaners and management representatives, as well as additional information drawn from the company's website, company reports and news articles. Rasmussen finds that working for cleaning platforms in Denmark, like other types of platform-mediated gig work, can be economically insecure,

physically demanding and mentally stressful. As Huseby also emphasizes, cleaners working for digital platforms are exposed to both industry-specific OSH challenges and challenges created by a digitalized work environment. While platform-based domestic cleaners in Denmark have a significant amount of flexibility, their working environment is characterized by insecure and unpredictable earnings. The cleaners are also exposed to substantial time pressure and often work overtime since the platform's algorithms determine how much time they are allocated for completing each task and they depend on favourable ratings and assessments from customers. Being dependent on positive customer reviews, furthermore, makes it difficult for cleaners to require that the customer provide them with sufficient equipment. This can create work environment hazards. Rasmussen's analysis also shows that cleaners can feel isolated and invisible, inhibiting collective mobilization.

[Chapter 5](#), written by Kristin Jesnes (Fafo, Norway) and Stine Rasmussen (Aalborg University, Denmark), is a comparative analysis of the food delivery industries in Denmark and Norway. It explores the cases of Foodora in Norway, Just Eat in Denmark and Wolt in both countries, investigating the working environment challenges facing app-based food couriers. Drawing on an analytical framework proposed by Ropponen et al. (2019), the analysis pays particular attention to the ways in which the food delivery platforms control their couriers through algorithmic management and the effects of this form of control on the workers' occupational safety and health. Jesnes and Rasmussen find that in addition to being physically demanding and mentally exhausting, the couriers' working environment is characterized by three main OSH risks: job and income insecurity, waiting time and time pressure, and harassment and unfair treatment. These jobs characteristics, they argue, are largely a result of the food delivery platforms' algorithmic management and intraplatform algorithmic change. However, the effects of algorithmic management are conditioned by the couriers' employment model, and Jesnes and Rasmussen find that compared to freelance models, employment relationships and collective agreements can mitigate the OSH challenges to some extent.

[Chapter 6](#), by Laura Seppänen (Finnish Institute of Occupational Health, Finland), continues the analysis of platform-based food delivery. Exploring the Finnish case and drawing on qualitative interviews with platform-based food couriers from 2017 and 2022, this chapter analyses transparency, opaqueness, autonomy and agency as key features of platform-mediated gig work and platform workers' work environment. Autonomy is often seen as a feature of a good work environment, and this chapter investigates how couriers' autonomy and agency are affected by the transparency, or lack thereof, of platforms' digitalized work arrangements. While couriers are attracted to platforms by the flexibility and autonomy these work arrangements offer, they are also monitored and evaluated by the platforms practices that limits their actual flexibility and autonomy. Furthermore, Seppänen shows how the couriers' autonomy and agency is both enabled and inhibited by the

transparency and opaqueness of the platforms' arrangements: Certain aspects of the operation are made visible to the workers, allowing them to make informed and autonomous decisions, while other aspects remain opaque, creating both unpredictability and stress. The chapter thus illustrates that the digitalization of work does not necessarily and always entail opaque forms of control but can also, under certain conditions, enable increased transparency. Furthermore, the analysis shows that while the platforms' operations might appear opaque, workers do develop an understanding of how they function, enhancing their agency. Still, Seppänen highlights how, in the case of food delivery platforms in Finland, particular aspects of the platforms' practices remain opaque, giving rise to complex and important dynamics of transparency, opacity, autonomy and control.

In the concluding chapter, [Chapter 7](#), Sondre Thorbjørnsen (Fafo, Norway) and Sigurd M. N. Oppegaard (Fafo, Norway) develop and present a risk factor framework for occupational safety and health, digitalization and forms of employment. This framework is based on the scoping review published at an earlier stage of this project (Bråten and Thorbjørnsen, 2023), relevant international research literature, the empirical case studies in the earlier chapters and the workshops with the Nordic labour inspectorates. The aim of the framework is to show how OSH risks can be articulated through digitalization and across different forms of employment. It identifies and discusses seven risk factors: isolation, deskilling, worker turnover, piece-rate precarity and stress, reduced autonomy, control and surveillance and increased OSH fragmentation. The chapter also highlights regulatory challenges associated with occupational safety and health for the future of work in the Nordic countries.

1.2 Remarks on the road ahead

This report and our overall analysis are based on a case approach, situating work environment challenges and OSH risks in the future of work in the Nordic countries through an exploration primarily of platform-mediated gig work. Still, the tendencies and challenges we identify and highlight can be relevant for a number of other industries and cases where digital technologies are combined with non-standard forms of employment. More research is nonetheless required to assess the working environment of the future in the Nordic countries. One important avenue for further research is analysing how new technologies can be used to *improve workers' occupational safety and health*. While previous research has argued that the digitalization of work has the potential to improve working environments, less is known about how and under what conditions this potential can be actualized (Christensen et al., 2020). It is also important to thoroughly investigate how digitalization can affect the working environment in manual occupations and traditional employment relationships, two types of cases that exhibit dynamics which our approach aimed primarily at exploring the effects of

digitalization on the working environment in non-standard forms of employment and based on empirical analyses of service work does not capture.

There is also a need for comprehensive and comparative research on how the regulatory framework of the Nordic labour market model can manage the OSH risks associated with digitalization and new work arrangements. This report has primarily been oriented toward exploring digitalization and working environment challenges in non-standard forms of employment at the level of the labour process and the workplace and not toward how these questions arise and are handled at the institutional level. The Nordic labour market model is often presented as a regulatory framework that generally provides workers with stable jobs and decent and safe working conditions (Nordic Council of Ministers for Labour, 2023). However, it is nonetheless an institutional arrangement characterized by significant tensions (Oppegaard and Nosrati, 2024) and with highly variable effects in different segments of the labour market (Valestrand and Oppegaard, 2022). Furthermore, the Nordic labour market model has undergone critical changes over the last decades, in parallel with broader social and economic transformations (Alfonsson, 2024). This highlights the importance of examining how labour market institutions in the Nordic countries today can deal with the challenges brought on by the future of work – for working environments and the labour market more broadly.

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Chapter 2

Theoretical background: Risks and working environment challenges in digitalized work arrangements across different forms of employment

Sigurd M. N. Oppegaard (Fafo) and Mona Bråten (Fafo)

2.1 Introduction

This chapter presents and discusses key themes in the research on working environment challenges and occupational safety and health hazards associated with digitalization and different forms of employment. We first discuss the conceptual frameworks used in analysing, discussing and regulating occupational safety and health in general. Second, we give a brief description of how occupational safety and health is regulated in the Nordic countries. Third, we survey the research literature on three key aspects of work environment challenges in the future of work: field technologies, non-standard forms of employment and platform-mediated gig work. As such, this chapter provides a conceptual backdrop for the empirical investigations in the chapters that follow.

2.2 Conceptualizing and regulating occupational safety and health

The concepts of “work environment” and “occupational safety and health” are often used interchangeably and in different fields. They are partly legal concepts, partly a subdiscipline of medicine and public health defining an area of scientific inquiry, and partly a sociological concept referring to features of a workplace or labour processes. The concept of a work environment tends to be used without a rigorous definition, referring broadly to the context, the environment within which work is performed. It is, in this sense, a feature of a job or workplace, composed of a number of different factors. According to the National Institute of Occupational Health of Norway (STAMI), work environment refers to how work is organized, planned and executed. It varies across different workplaces, necessitating different approaches in different contexts, and affects workers’ health and engagement and the organization’s results and productivity (STAMI, 2021: 13). Similarly, the International Labour Organization (ILO) (ILO, n.d.) highlights the work environment as a factor that can affect workers’ health negatively.

STAMI (2021: 55ff) differentiates between four types of work environment, or work environment exposures. First, the *organizational and psychosocial work environment* concerns the factors associated with how work is organized on the one hand, including formal regulations and practices such as scheduling, working time, layoffs, and hierarchies, and the formal and informal relationships in a workplace and their consequences on the other hand. The second type of work environment in STAMI's typology is the *mechanical work environment*. Sometimes referred to as the *ergonomic work environment*, this is the aspect of a work arrangement that affects how the work is conducted mechanically, emphasizing risk factors such as static or monotonous movements, heavy lifting and so on. Third, the *chemical and biological work environment* refers to substances workers are exposed to during work. Fourth and finally, the *physical work environment* refers broadly to the physical conditions under which work is conducted, such as factors associated with the buildings or equipment used, noise levels, temperature, light and radiation.^[2]

For organizations such as the ILO and the World Health Organization (WHO), occupational safety and health is a key concern. According to the ILO, a healthy work environment is aimed at promoting and maintaining the "highest degree of the physical, mental and social well-being of workers" (ILO, n.d.; see also WHO, n.d.). Occupational safety and health (OSH) has as its objective to "promote and maintain [the] highest degree of physical, mental and social well-being of workers in all occupations" (WHO, n.d.). In the 1984 International Labour Conference Resolution on improving working conditions and work environments, for example, the ILO emphasizes the following principles: "Work should take place in a safe and healthy working environment; conditions of work should be consistent with workers' well-being and human dignity; work should offer real possibilities for personal achievement, self-fulfilment, and service to society" (ILO, n.d.).

As the above conceptualization of work environments and occupational safety and health highlights, workers are exposed to several factors that might affect their health and well-being negatively. The work environment has thus become a subject of state and collective agreement regulations (Abrams, 2001).^[3] The Nordic countries have developed a number of common features in legislation and regulation of the labour market, often referred to as the "Nordic labour market model" (Andersen et al., 2014). What has been described as a "Nordic model of OSH regulation" was developed in the 1960s (Lindøe, 2002), and today, OHS regulations in the Nordic countries are based on a common EU Directive, 1989/391/EEC. This is often referred to as the "Framework Directive", which aims to promote improvements in safety and health at work. The EU OSH legislation centres around the concepts of the "working environment" and "health". In this

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2. The Norwegian Labour Inspection Authority has further specified these various aspects of the work environment into a conceptual model with different entry points for assessing the work environment in a business organization. The model is based on the Working Environment Act (2006) and includes various aspects that regulatory authorities should examine and impose requirements on (Arbeidstilsynet, n.d.).
 3. Safer working conditions and healthier working environments have also historically been an important issue for the labour movement (Abrams, 2001; Alsos and Bråten, 2023; Holdren, 2020; Rosner and Markowitz, 2020).

context, the term "working environment" as emphasized by ILO and WHO as seen above goes beyond accident prevention to include humane work process design, work organization, and health promotion (EU-OSHA, 2013/2021). Similarly, "health" in this context is defined by the WHO as complete well-being, including physical, mental and social aspects, not just the absence of illness (EU-OSHA, 2013/2021).^[4]

Occupational safety and health regulations in the Nordic countries aim to ensure a secure and satisfactory working environment. These regulations encompass a wide array of standards and requirements, covering aspects ranging from the physical workplace and technical equipment to the psychological work environment, accessibility and accommodations. These regulations also address the methods and measures for ensuring compliance, which include risk assessment and prevention, internal control systems and consultation and cooperation with employee representatives. Thus, these regulations and the organizations enforcing them revolve around the broad objective of safeguarding workers' health and safety (Hotvedt et al., 2020). The rules on internal control systems for supervising, controlling, and improving OSH are essential principles of the Nordic approach to working environment regulation. This is facilitated in all the Nordic countries through organized cooperation with employees' representatives. Employee representation in the workplace thus plays a crucial role in monitoring compliance with OSH standards (Hotvedt et al., 2020).

All the Nordic countries also have labour inspection authorities with the mandate to oversee and enforce compliance with OSH standards. These authorities can issue binding orders, impose fines and halt hazardous activities, with the possibility of criminal sanctions. Still, the regulations chiefly operate by assigning duties to employers to protect their employees. While traditional employees are covered by their employers' responsibilities, the Nordic OSH legislation does not necessarily protect workers classified as self-employed contractors to the same extent (Hotvedt et al., 2020).

Over the last decades, changes in the work environment have received significant attention from scholars and regulators. Important trends such as new technologies, the growing prevalence of non-standard forms of employment, new types of organizations, new industries and so on have resulted in new ways of organizing and conducting labour, which, in effect, have consequences for workers' health and well-being (EU-OSHA, 2018; Nielsen et al., 2022; Papadopoulos et al., 2009). Automation, for example, can protect human workers from hazardous environments, but it might also introduce new risks. EU-OSHA started the "Healthy Workplaces Campaign 2023–2025" in 2023 to meet these emerging OSH challenges. The campaign focuses on how new digital technology affects work and workplaces, along with the challenges and opportunities it presents for the work environment (EU-OSHA, 2018).

4. The Nordic model for OSH has influenced regulation within the EU and vice versa (Lindøe, 2002; EU-OSHA, 2013/2021).

2.3 Digitalized work arrangements and non-standard forms of employment

The notion that new technologies will reduce the demand for labour power by increasing productivity and automating tasks is old. Aristotle, for example, used the concept of "automatous" to discuss the future potential of self-moving tools (in particular self-weaving shuttles and self-playing harps) and their consequences, arguing that such innovations might result in a situation without the need for slaves (Bhorat; 2022; Bielskis, 2023). These – and other similar speculations – have not, however, come to fruition (Benanav, 2019a, b). Still, new technologies have, without abolishing the need for human labour power, had significant consequences for how work is being done and by whom (Aloisi and De Stefano, 2022; Frey, 2019). These changes are both quantitative and qualitative, affecting both occupational structures and the content of workers' labour processes (Rolandsson et al., 2019).

In the literature on technological change and work, one of the tendencies often highlighted is that of "upskilling" (Gallie, 1991; Davis and Eynon, 2018) or "upgrading" (Rolandsson and Dølvik, 2021).^[5] Upskilling is an example of how new technologies can transform labour processes and their content to increase skill requirements (more conception, less mere execution), reduce the share of potentially heavy manual tasks and increase wages, thus leading to "better" jobs (Gallie, 1991; Martinaitis et al., 2021). At the aggregate level, there has been a tendency toward upskilling in the all the Nordic countries except Denmark over the last two decades, with the share of employment in highly skilled and paid occupations increasing and the share of employment in occupations at the lower end of the spectrum decreasing (Rolandsson and Dølvik, 2021).^[6]

At the same time, other tendencies highlight how new technologies such as digitalization can both increase existing occupational safety and health risks and create new ones (EU-OSHA, 2019). Digital technologies can have significant consequences for workers' working environment (Bråten, 2019), and new risks, working environment challenges and occupational safety and health hazards associated with digitalization have become a widely discussed topic in recent years (Christensen et al., 2020; Christensen, 2021; EU-OSHA, 2019; Howard, 2017). Along this line of reasoning, new technologies pose new challenges as they make it possible for work to be coordinated and performed remotely. Such developments have enabled new business models such as the gig and platform economy, which we discuss below and reorganizations of workplaces. However, the literature on

5. In contrast to upskilling, what is often called the "deskilling" tendency, or what Braverman termed the "degradation of labour" (Braverman, 1974), describes how, under capitalism, there is a tendency toward managers simplifying and dividing tasks – reducing skill requirements – to make workers more easily replaceable in an effort to reduce labour costs (for a discussion of this tendency, see Littler and Salaman, 1982; Smith, 2015; Spencer, 2000).

6. In Denmark, Rolandsson and Dølvik (2021) note there has been a tendency toward "polarization", i.e., increased employment in both highly skilled/paid and low-skilled/low-paid occupations, but declining employment in the middle strata.

work environment challenges associated with digitalization also argues that these models have also emerged out of new forms of monitoring, controlling and surveilling workers and labour processes (see for example Hagen and Oppegaard, 2020). What consequences technologies have, however, varies depending on multiple factors, including the occupation and job content in question, markets and competition between employers, the power balance between workers and employers and the regulatory context (Dølvik and Steen, 2019; Peng et al., 2018).

In a literature review on digitalization and occupational safety and health, Christensen et al. (2020) showed that technological development is associated with poor working conditions and identify factors that mitigate the potential negative effects of new technologies. They found that the same technological change can have both positive and negative effects on work environments and occupational safety and health, depending on the context within which it is deployed, how it is implemented and which function the technology has in the organization and labour process. Important aspects in this respect are workers' autonomy, involvement, co-determination and training. The literature review highlighted two gaps in the research on new technologies and work environments. First, there is a need for studies that explore the specific aspects of different technologies and their implementation; and second, there are few studies directly analysing occupational safety and health in the gig and platform economy (Christensen et al. 2020).

In the following, we discuss the work environment risks associated with digital transformation by exploring three aspects of this transformation. First, we discuss field technologies, namely technologies that enable the coordination and monitoring of work outside a fixed workplace. Second, we highlight the occupational safety and health consequences of non-standard forms of employment. Third, we explore platform-mediated gig work and the occupational safety and health risks and challenges associated with these forms of work. Platform-mediated gig work can be seen as combining a type of field technology (the digital platform, often in the form of a mobile application) with a non-standard form of employment (usually self-employment).

2.3.1 Field technologies

Field technologies, electronic systems for registering data on workers outside a fixed workplace (Tranvik and Bråten, 2015), illustrate and highlight some of the challenges raised by new digital technologies. Field technologies record and register massive amounts of data and can provide detailed descriptions of workers and of how, when and where work is being and has been done. They are often used in industries such as transport, logistics, security and cleaning and care work and might in some cases take the form of smartphones and tablets. Field technologies make it possible for an employer to observe and control how work is performed

from a distance. These technologies are therefore often used in organizations where workers work outside a fixed workplace.

Electronic travel logs, GPS-based logging systems installed in vehicles that measure time, distance travelled and position, are an example of field technology. The data these logs record cannot be edited or deleted by users and is often used to monitor whether professional drivers comply with regulations regarding driving time and rest periods (Levy, 2023). Fleet management systems are another example of field technology. These are systems that coordinate a fleet of vehicles for different purposes. They can have the function of keeping stock of a fleet or of managing assignments and allocating workers to vehicles and vehicles to tasks (Monnerat et al., 2019). In the taxi industry, the dispatching centres (also known as radio dispatchers or taxi centrals) that allocate bookings to drivers are an example of fleet management (Steen, 1988; Aarhaug et al., 2020). In home care work, digital task lists can also be seen as an example of a field technology that is used to coordinate tasks, workers and clients. Through smartphones or tablets, workers can plan and report on each visit and get access to information about patients, such as medication dosage (Underthun and Steen, 2018).

A final example of field technology is handheld devices such as the scanners used by workers in warehouses. In the case of Amazon in the United States, warehouse workers are equipped with scanners that are used to process the packages they handle. These scanners have built-in location tracking and can tell the workers where they must go to find the next items to process. However, they also collect detailed data on the workers. Vallas et al. (2022) found that this data is used to build real-time profiles of and evaluate individual workers' performances. The scanners and the data they collect make it possible to analyse production rates at an individual level and compare workers with each other, averages, and performance targets. If a worker is found to perform poorly, they might be automatically flagged and potentially receive a notice or warning or – subsequently – be terminated.

Previous research has found that field technologies can have a significant effect on working conditions and occupational safety and health. For example, they can lead to isolation and fewer social interactions between colleagues (Håkansta, 2022), partially due to the increased flexibility in when and where work can be performed such technologies offer (Håkansta and Bergman, 2018). Others argue that field technologies have a tendency to increase standardization of work tasks and decrease workers' autonomy, leading to increased dissatisfaction and decreased job motivation (Bråten and Tranvik, 2012; Håkansta, 2022; Tranvik and Bråten, 2015). Field technologies are also associated with work environment challenges such as reduced well-being, job satisfaction, competency development and learning opportunities (Håkansta and Bergman, 2018; Tranvik and Bråten, 2015), and increased stress due to detailed monitoring of how much time workers spend on tasks (Aiello and Kolb, 1995; Bråten and Tranvik, 2012). Other studies have found

that field technologies can threaten workers' privacy by giving employers access to a lot of data on individual workers and their work. A lack of privacy can impact the work environment negatively (Tranvik and Bråten, 2015).

2.3.2 Non-standard forms of employment

Non-standard forms of employment refer generally to all forms of employment that differ from the so-called standard employment relationship, which, in the Nordic context, generally entails full-time permanent employment. The most common examples of non-standard forms of employment are part-time work (long part-time work is often defined as between 15 and 29 hours of work per week, while marginal part-time work entails less than 15 hours of work per week), temporary employment (both fixed-term contracts and temporary agency work) and self-employment (Ilsøe and Larsen, 2021).

Different forms of employment tend to be associated with different legal protections and different levels of access to social benefits and welfare services (Rasmussen et al., 2019). Employees in the Nordic countries are covered by legislation on the working environment. These regulations provide employed workers with certain rights, like the right to unionize and bargain collectively and the right to have a safety representative; stipulate how OSH should be organized in workplaces; and specify requirements of the work environment (Hotvedt et al., 2020). Workers in non-standard forms of employment, however, are not necessarily covered by the same regulatory framework. Workers classified as self-employed contractors, for example, are legally seen as businesses and essentially excluded from the stipulations in the working environment act and are usually not included in the same kinds of social benefit and welfare schemes as legal employees (Alsos et al., 2022; Jesnes and Oppegaard, 2020). In addition, workers in non-standard forms of employment often have work arrangements characterized by greater insecurity and unpredictability than full-time employees. Part-time workers might earn only a portion of the wages needed to make a living from a given employer, requiring them to juggle multiple sources of income, while temporarily employed workers might lose their means of making a living when their contract ends. In addition to not being covered by the working environment regulations, self-employed workers are often paid per task completed rather than for the time actually spent at work. Still, there are variations within the same form of employment in regard to the degree to which OSH regulations are practiced and organized (Andersen and Bråten, 2022; Andersen et al., 2019; Bråten, 2016, 2018; Bråten and Oppegaard, 2020; Bråten et al., 2023).

Non-standard forms of employment can offer new and expanded economic opportunities for some workers, particularly for segments of the workforce with few other labour market opportunities (Valestrand and Oppegaard, 2022). Some research indicates, for example, that in certain cases, self-employment and the associated freedom from bosses can appear attractive for migrant workers who

previously have had experiences with unfriendly bosses or co-workers (Altenried, 2022; Jesnes and Oppegaard, 2023; Waldinger, 1986). There are, however, significant occupational safety and health risks associated with non-standard forms of employment. As Howard (2017: 7) argues, there is "mounting evidence [that] shows that these novel ways of working pose occupational safety and health risks for some workers" (see also Cummings and Kreiss, 2008). Studies have found that there are higher rates of accidents and injuries among workers in non-standard forms of employment, which can partially be explained by a lack of training and increased fear of job loss, but also by the higher prevalence of this kind of employment in high-risk sectors such as construction, agriculture and transportation (Tran and Sokas, 2017; see also Fabiano et al., 2007).

Workers in non-standard forms of employment also tend to have flexible shifts and working hours. Previous research has found that working irregular hours and rotating shifts increases the frequency of psychological problems among workers. Sleep problems, for example, are associated with non-standard working hours, which increase the risk of depression, while irregular schedules and over-time work can lead to chronic fatigue due to stress and limited periods of rest between shifts (Papadopoulos et al., 2009: 944; see also Lie et al., 2014; Samant, 2020). Rotating shifts, deregulated working hours and limited resting time; night work, overtime and occupational stress also increase the frequency of accidents at work (Papadopoulos et al., 2009: 945; see also Lie et al., 2014). Job insecurity and work intensification are, furthermore, linked with a higher frequency of occupational accidents, as well as mental, emotional and physical exhaustion (Papadopoulos et al., 2009: 945), while flexible forms of employment increase the probability of accidents among workers (Papadopoulos et al., 2009: 945).

2.3.3 Platform-mediated gig work

Platform-mediated gig work can be seen as a form of work that highlight the challenges brought on by new digital technologies, new ways of organizing work *and* non-standard forms of employment (Bråten and Thorbjørnsen, 2023; Gregory, 2020). These forms of work can be conceptualized as comprised of a formal work arrangement – the gig aspects – and a technological work arrangement – the platform aspects^[7] (Oppegaard, 2021, 2023). The formal work arrangement refers to workers' forms of employment, wage systems, scheduling practices and so on. Gig and platform workers tend to be classified as self-employed independent contractors (Jesnes and Oppegaard, 2020; Piasna et al., 2022), although some are classified as employees, either of the platforms (Jesnes, 2019; Jesnes and Oppegaard, 2023) or of intermediary companies (Oppegaard, 2020). They are, furthermore, usually paid per completed task (Woodcock and Graham, 2019).

7. In practice, however, these work arrangements interact to produce gig and platform workers' working conditions and work environments, and the distinction between the two aspects remain primarily analytic.

The technological work arrangement, on the other hand, refers to the ways in which the digital platforms are used to coordinate, organize and control the workers and the labour processes (Oppegaard, 2021). Functioning like field technologies, digital platforms, usually in the form of a mobile application, monitor and instruct workers. This is often referred to as “algorithmic management” (Aloisi and De Stefano, 2022; Altenreid, 2022) or platform-based control (Oppegaard, 2023; Oppegaard and Jesnes, forthcoming). In the literature on platform-mediated gig work, “algorithmic management” is often conceptualized as comprising of three techniques (Lee et al., 2015).

First, platforms allocate tasks to workers based on the real-time data they collect on workers, customers and locations, among other things. Thus, platform workers generally do not choose their own customers but are assigned requests they can accept or decline (Oppegaard, 2023). Since workers are usually paid by the piece, or a piece rate, they tend to accept most requests. Moreover, declining requests can lead to a worker’s account being “deactivated” by the platform (Wells et al., 2021). A piece rate, however, can in itself also contribute to time pressure and stress and thus constitutes an individual occupational safety and health risk factor (Garben, 2017).

Second, the platforms adjust the prices of the service according to variations in supply and demand. From the companies’ perspective, such mechanisms serve to provide workers with incentivized to supply their labour power when demand is high (see Chen and Sheldon, 2015).^[8] These dynamic pricing systems are often combined with different types of bonus schemes and make earnings unpracticable and variable according to a set of opaque variables. According to Dubal (2023), this leads to individualized payment systems that can be characterized as “algorithmic wage discrimination”.

Third, platform companies use different rating systems to evaluate workers.^[9] The mechanisms used vary widely across different platforms. Some, like those used by taxi platforms, allow customers to assign drivers between one and five stars after each ride. If the drivers’ average rating falls below an undisclosed threshold, the drivers might be “deactivated” (Oppegaard, 2023; Wells et al., 2021). Platform companies also monitor how many requests workers accept, decline and cancel. These ratings can have consequences for future requests and, as a result, future earnings. On some platforms, the number of requests workers accept and the speed with which they complete a task can have consequences for what shifts they can work, as we will see in Chapter 5 on platform workers in the food delivery industry in Denmark and Norway. Chapter 3 on cleaning platforms in Norway, furthermore, shows how these kinds of rating systems shift the power balance between workers and customers in the latter’s favour, creating new insecurities for

8. At the time of writing, the authors of this study were employed by Uber.

9. The rating systems the platforms use have been described as key mechanisms for producing “trust” and enable transactions between strangers on digital platforms (Botsman and Rogers, 2011) and online markets in general (Dellarocas, 2003).

the former. While the rating systems vary in the degree to which the evaluations are transparent and visible to workers, they generally create additional unpredictability for workers (Oppegaard, 2021).

As a combination of field technologies and non-standard forms of employment, platform-mediated gig work can be seen as an extreme case illustrating the tendencies present in the digitalization of work and non-standard forms of employment more generally. As Huws (2015) argues, the occupational safety and health risks associated with platform-mediated gig work are also present in many other service sector jobs.^[10] Platform-mediated gig work is nonetheless seen as a form of work with significant occupational safety and health risk factors (Garben, 2017; ILO, 2023). The literature on platform-mediated gig work highlights several work environment risks and occupational safety and health hazards associated with both the formal work arrangement and the technological work arrangement of this kind of work. The challenges emerging from the formal work arrangement largely overlap with the challenges associated with non-standard forms of employment discussed above (ILO, 2023). Studies specifically exploring occupational safety and health in the gig and platform economy highlight the unpredictability of these work arrangements, wherein workers are exposed to significant market risks (Maffie, 2023). Recent analyses of platform-mediated gig work in Europe have found that due to the piece rate model, workers often have to work long hours to make a decent living (Piasna et al., 2022) and spend a substantial segment of the working day waiting for requests from the platforms, or performing unpaid labour (Pulignano et al., 2021). Platform workers' lack of job security, through their non-standard forms of employment and unpredictable pay (Schor et al, 2023), is an important factor that often is found to potentially contribute to poor overall health (Tran and Sokas, 2017). The piece rate model, furthermore, incentivizes workers to take risks and – particularly among couriers and drivers – to move fast and hurry (Garben, 2017; Gregory, 2020).

For delivery workers and drivers, both in traditional offline and digitalized work arrangements, road traffic also constitutes a significant safety hazard (Tran and Sokas, 2017). Christie and Ward (2019) argue that drivers and couriers working for gig platforms are exposed to risk factors such as fatigue, pressure to violate traffic regulations and being distracted by their phones or tablets. They found that 42 percent of drivers and delivery workers in their sample reported being involved in an accident where their vehicle had been damaged, and ten percent reported that they themselves or other persons had been injured in a collision. These workers tend to have little safety and health training (depending on context and whether they are required to be licensed professional drivers). They therefore argue that the rise of

10. Furthermore, platform-mediated gig work has to a large extent emerged in already "gigified" and/or poorly regulated industries. In Norway, for example, we have seen that platforms primarily have gained foothold in transportation, logistics, cleaning, and creative services (Oppegaard, 2020). These are industries with low collective agreement coverage and unionization rates, where wages usually are relatively low and where piece-rate models are prevalent. In a Nordic context, these industries can be seen as the "fringes" of the Nordic labour market model, i.e., industries where the core features of the Nordic labour market model have not been institutionalized (Oppegaard and Nosrati, 2024; Valestrand and Oppegaard, 2022).

gig platforms in transportation and delivery produces significant risk factors that affect the safety and health of not only the workers themselves but also other road users.

As mentioned, platform workers are subjected to the same kinds of risks and work environment exposure that long have characterized the industries in which the platforms have emerged (Huws, 2015). Hence, it is important to recognize that the work environment risks platform workers are exposed to vary significantly between industries, labour processes, control systems and regions (Bajwa et al., 2018). One important factor identified in the literature on occupational safety and health is age; platform workers tend to be younger, which constitutes an independent risk factor for injuries at work (Garben, 2017; Tran and Sokas, 2017). Another factor that is likely to be influential is the role of choice, as previous research has found that women involuntarily working temporary jobs have higher levels of psychological distress and more somatic complaints than those who prefer temporary work (Tran and Sokas, 2017).

While the work environment challenges associated with platform-mediated gig work both overlap with non-standard forms of employment in general *and* vary with industry- and labour process-specific hazards, the effects of the platforms' algorithmic management systems and platform-based control (Aloisi and De Stefano, 2022; Oppegaard, 2023) might constitute an independent source of insecurity and unpredictability (Oppegaard, 2021) and therefore have their own risk factors. Bérastégui (2021), for example, discusses how platforms' continuous surveillance, automated control techniques and rating systems contribute to increase the pace of work for platform workers. Another key factor for platform workers' occupational safety and health is allocation of responsibility for providing workers with protections and occupational safety and health measures (Samant, 2020). Since platform workers are usually classified as self-employed contractors, they are often not covered by the working environment acts and the platform companies evade employer responsibilities. This makes it difficult to determine which actors are responsible for creating a safe and healthy work environment and providing safety training and personal protective equipment (Randolph, 2019).

The work environment challenges in platform-mediated gig work are thus simultaneously both new and old – i.e., associated with the industry in which the platforms operate and the workers labour processes – and the occupational safety and health risk factors can be both physical and psychological (Garben, 2017). The above review also identifies three key areas of occupational safety and health risks in platform-mediated gig work: unclear OSH regulations and employer responsibilities and a lack of social protections, including access to benefits and welfare services, associated with the workers' non-standard forms of employment; algorithmic management and surveillance and privacy problematic emerging from the platformized work arrangements; and organizational and psychosocial conditions, including unpredictable earnings, opaque control techniques, stress and isolation.

Finally, platform workers' form of employment is contested (Hotvedt, 2016, 2020; Johnston et al., 2023; Niebler et al., 2023). Some argue that these workers should be regarded as the platforms' employees since the workers tend to be dependent on and, in practice, subordinate to the platforms and the control they exercise. Reclassification of workers, however, is a complicated legal process and in many countries, employment status is determined on a case-by-case basis (Garben, 2017). While there are examples of platform workers being classified as employees in the Nordic countries (Ilsøe and Söderqvist, 2023; Jesnes, 2024), the potential misclassification of these workers has nonetheless emerged as an important political point of contention (Jesnes and Oppegaard, 2020). In January 2024, the Norwegian Working Environment Act was amended to clarify the conditions under which workers can be classified as self-employed contractors and when they are to be considered employees. The amendments essentially codified a legal presumption of employment, shifting the burden of proof onto companies who wish to use self-employed workers. With the passing of the EU directive on platform work in March 2024, which, other things, asks member states to enact legal presumptions of employment (European Council, 2024), the other Nordic countries might follow Norway in tightening the regulations on forms of employment.

2.4 Conclusion

The above discussions highlight the continued need for regulations, enforcement of legislation, and inspections to ensure healthy work environment for workers. What the "future of work" will bring remains an open question, and the answer depends on a myriad of factors. It is not only a question of technology and technological capabilities or of new business models and strategies. Politics and regulations will continue to shape the world of work, enabling and constraining new forms of work.

This chapter has explored three key themes related to the future of occupational safety and health: field technologies, non-standard forms of employment, and platform-mediated gig work. This exploration has highlighted that there are significant occupational safety and health risk factors associated with digitalization of work and non-standard forms of work. The risk factors are associated with new forms of control, opaque and unpredictable management systems and a lack of OSH regulations. However, the risks workers face are also tied to their labour process and industry-specific features, as is emphasized with the case of platform-based taxi drivers and food couriers. Nonetheless, in these cases, the pre-existing risk factors might be exacerbated by new digital technologies. In the following chapters, we investigate these themes in detail through empirical and conceptual analysis of case studies from the Nordic countries.

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Chapter 3

A stubborn stain? Occupational safety and health on cleaning platforms in Norway

Johanne Stenseth Huseby (Fafo)

3.1 Introduction

Throughout the past decade, a new form of work has emerged in the Nordic labour markets, in which isolated jobs are coordinated and distributed through digital platforms, commonly referred to as “platform work” (Valestrand and Oppegard, 2022). So far, most research studies concerning platform work have focused on occupational groups like food couriers and taxi drivers operating for companies like Uber and Foodora. However, platforms are also emerging in the cleaning industry, although they have received comparably little attention (Wiesböck et al., 2023). Most cleaners who work for platform companies provide cleaning services in private households, and as most platform workers are self-employed, they generally work alone. Unlike food couriers and taxi drivers, these cleaners are therefore rarely noticeable on the streets (see Seppänen, [Chapter 6](#)). Thus, cleaners who work through digital platforms represent a spatially fragmented group, which poses challenges for trade unions and supervisory authorities, as well as for researchers who try to reach them (Wiesböck et al., 2023). These challenges are reflected in the insufficient data available concerning this occupational group.

Through a desk study and semi-structured interviews, this chapter investigates the working environment challenges that accompany digitalized work arrangements in the Norwegian cleaning industry. It raises questions concerning working environment challenges that differentiate platform cleaning from traditional cleaning and how these challenges appear and unfold in a market that is “unavailable” to most supervisory authorities. The platform company “Vaskehjelp” is used as the chapter’s main example as it is the largest platform company in the Norwegian cleaning industry.

3.2 The Norwegian cleaning industry

The cleaning industry is labour-intensive, with few requirements for formal education, high levels of turnover, and low costs of establishing a new business (Trygstad et al., 2018; Andersen et al., 2021). Until 2011, Norwegian authorities performed limited control checks in the industry due to a lack of regulations, making it particularly exposed to questionable actors looking to make "a quick buck". For this reason, there have been many reports on social dumping and undeclared work in the past decades. The National Occupational Health Surveillance (NOA)^[11] reports that approximately 68,000 people work as cleaners in Norway today (NOA n.d. a). Of these, 72 percent are women, 58 percent are unionized, and 53 percent work part time. Furthermore, the fact that there are few requirements for language skills and formal education, and the manual nature of the work, make the industry a popular entry into the Norwegian labour market for immigrant workers. In 2017, 70 percent of workers in the industry had an immigrant background, most of whom had immigrated from Eastern Europe (Trygstad et al., 2018).

Several of the challenges that characterize the industry intensified after the EU enlargements in 2004 and 2007 (Andersen et al., 2016). Increased labour supply and lower wages made many businesses lower their prices for cleaning. This made it difficult for businesses that paid higher wages to compete. As the wage share of expenses is high, effectiveness and price are decidedly the most important competition parameters in the cleaning market (Trygstad et al., 2018). A distinction is commonly made between the "professional cleaning market" of professional customers in the public and the private sectors and the "private cleaning market", which is the consumer market. This chapter is mainly concerned with the private market as platform companies primarily offer cleaning in private households.

3.2.1 Institutional changes

Due to the challenges in the industry, a tripartite sector programme was established in 2010 as a cooperation between the authorities and the social partners (Trygstad et al., 2018). The aim of introducing sector-specific programmes was to promote decent work in parts of the labour market that are characterized by circumstances such as low union densities, pressured wage and working conditions, challenges related to occupational safety and health (OSH) and large shares of foreign workers (Andersen et al., 2021). Participants in the sector programme cooperate on evaluating the need for new or adjusted measures to strengthen compliance with relevant regulations in the industry.

11. NOA is organized as a department at the National Institute of Occupational Health (STAMI) (NOA, n.d. b). NOA coordinates and systematises knowledge on the working environment and health for social partners, public authorities and stakeholders.

The low cost of establishing a new business, and the strong increase in labour supply from new EU Member States, resulted in price pressure and challenges for the parts of the industry that were not covered by collective agreements (Jordfald and Svarstad, 2020). Other trends, such as a high turnover rate and the high proportion of immigrants having their first encounter with the Norwegian labour market, eventually led the Norwegian Confederation of Trade Unions (LO) to require a general application of the industry's collective agreement (ibid.). This requirement was supported by the Confederation of Norwegian Enterprise (NHO), representing the employers' side. The Tariff Board, which holds the authority to generally apply collective agreements, granted LO's request in 2011. This meant that all cleaning companies had to follow generally applied wage rates from the "cleaning agreement" ("Renholdsoverenskomsten").^[12]

The cleaning agreement

The generally applied collective agreement states that the hourly minimum wage in the cleaning industry is NOK 216.04, or NOK 165.05 for employees under the age of 18 years (Norwegian Labour Inspection Authority, 2023). The agreement also includes requirements for employers to supply employees with the necessary personal equipment, such as workwear and shoes (Valestrand & Oppegaard, 2022). The customer is obliged to ensure that the supplier fulfils the generally applied terms. The general application does not cover self-employed workers, as they are not classified as employees and therefore not part of the collective agreement. Still, generally applied collective agreements have traditionally had a norm-creating effect on the labour market (Alsos & Eldring, 2015). This also means that these agreements can place economic pressure on companies who use self-employed workers, making it difficult to recruit workers if they pay worse than their competitors.

In 2012, an authorization scheme for cleaning companies was introduced, requiring all cleaning companies operating in Norway to be authorized by the Labour Inspection Authority (Norwegian Labour Inspection Authority, n.d.). The authorization process involves an application and documentation process through "Altinn".^[13] All companies providing cleaning services must apply, including sole proprietorships. Part of the scheme is the use of health, safety and environment cards (HSE cards) that allow the authorities to identify the cardholder and the company they work for. Breaches of the scheme may result in penalties pursuant to Chapter 19 of the Working Environment Act (WEA) or the loss of authorization

12. Between LO and the Norwegian Workers' Union on the employee-side, and NHO and the Norwegian Federation of Service Industries and retail representing the employer-side.

13. Altinn is an internet portal for digital dialogue between private individuals, public agencies, and businesses, as well as a technical platform for government bodies to develop digital services (Altinn, 2017).

(Arbeidsmiljøloven, 2005). As it is illegal for both public and private actors to purchase cleaning services from unauthorized companies, all authorized cleaning companies are gathered in a public register “the cleaning register” (Norwegian Labour Inspection Authority, n.d. a).

The institutional changes that were implemented in the industry throughout this period, are closely linked to what is known as the Nordic model, which describes the ways in which the Nordic countries organize their welfare states and labour markets (Valestrand, 2023). The model is characterized by an active state, strong trade unions, welfare arrangements and coordinated wage determination. Valestrand (2023) argues that throughout the past decade, cleaning services coordinated through digital platforms have become part of the industry, but often outside of the traditional frame of the model, partly because platform workers generally are self-employed. This has great implications for workers’ social and labour rights, as self-employed workers are excluded from a number of labour rights and welfare systems traditional employees are entitled to (Jesnes, 2019). For instance, self-employed workers are not covered by the WEA, which governs most matters regarding occupational safety and health and welfare rights such as pension, taxes, unemployment benefits, parental leave and the like (Arbeidsmiljøloven, 2005).

3.2.2 Occupational safety and health in the cleaning industry

The cleaning industry is labour intense and characterized by time pressure, and the work pressure in the industry has been described as increasing (Trygstad et al., 2018). Nevertheless, NOA reports that of the 68,000 persons who work as cleaners in Norway, 51 percent are either unsure whether the enterprise they work for has an occupational health service^[14] or state that it does not (NOA, n.d.).

In general, cleaners are at greater risk of skin ailments or diseases because their hands are in contact with water and chemicals for longer periods of time and they use airtight gloves (Trygstad et al., 2018). NOA reports that 74 percent of cleaners are exposed to contact with chemicals (NOA, n.d.). Furthermore, cleaners are among the occupational groups that are the most exposed to mechanical working environment factors such as heavy lifting, lifting in uncomfortable positions, working on the knees, or crouching, and working with their hands above their shoulders (Trygstad et al., 2018). NOA states that 48 percent of cleaners report neck and shoulder pain, with five out of six saying it is due to their work, and 49 percent report back pain, with five out of eight reporting that it is due to their work (NOA, n.d.).

Cleaners generally perform their work separately from the enterprise they work for, and many cleaners start and finish their working day at the location of the

14. Occupational health services help employees and employers monitor the working environment within their company by providing professional consultancy services aimed at prevention efforts concerning health, safety and the environment (Norwegian Labour Inspection Authority, n.d. b).

customer (Trygstad et al., 2018). It is also common for cleaners to carry out their work for several customers at different locations on either a daily or weekly basis, and NOA reports that about 43 percent of all cleaners work alone (NOA, n.d.). As the location of the customer is where the cleaners spend most of their working hours, their work and working environment are highly influenced by the relationship between themselves and the customer. Trygstad et al. (2018) also point out that cleaners' experience of their working environment will be influenced by the employer's organization of the work, or the lack thereof.

3.2.3 Occupational safety and health in platform cleaning

On behalf of EU OSHA,^[15] Lenaerts et al. (2022) provide an overview of regulations, policies, practices and research regarding digital platform work and OSH. They find that the current body of research on OSH in platform work highlights precarious employment conditions, including a lack of autonomy and control, poor job security, low income, irregular working times and unconventional workplaces, as well as a lack of collective representation. Moreover, they considered that uncertainty regarding platform workers' employment status constitutes a central challenge in terms of OSH. Like Valestrand (2023), they emphasize that this has implications for workers' rights and obligations in relation to social protection. Lenaerts et al. (2022) argue that while working for an online platform and a traditional company may involve very similar tasks and associated risks, the risk is likely higher for platform workers. The reason for this is the combination of working conditions in platform work and the need to be allocated more jobs and maintain good ratings.

Lenaerts et al. (2022) also problematize how the non-standard working arrangements that characterize platform work challenge the responsibility for OSH management of those providing the work (the platforms), the workers involved (the platform workers), and OSH professionals (such as safety representatives and labour inspectorates). Similarly, Kusk et al. (2022) emphasize how platform companies often present themselves as tech companies to avoid regulations within the industry they are entering, even though human supporters are facilitating the work. They carried out a qualitative study of platform workers' perspectives on cleaning and food delivery platforms in a Danish context. One of their main arguments is that platform companies have, both rhetorically and practically, an interest in limiting the focus on the human aspects of the work, partly because it lets them avoid employer responsibility.

Wiesböck et al. (2023) have also researched domestic cleaners in the platform economy. Like Kusk et al. (2022), they argue that platform companies do not act as neutral intermediaries or matchmakers but actively influence cleaners' labour processes and opportunities through forms of control. Amongst other things, Wiesböck et al. (2023) find that the oversupply of cleaning profiles on digital

15. The European Agency for Safety and Health at Work.

platforms can lead to wage degradation, pressure to respond to requests immediately and a threat of being permanently replaced if workers are forced to cancel a job, for instance in cases of illness. Wiesböck et al. (2023) also shed light on the use of customer evaluations, arguing that customers are granted significant and lasting power to structure workers' prospective job opportunities. Lenaerts et al. (2022) emphasize that maintaining a good rating, and dealing with the consequences of a bad rating, can cause significant stress for platform workers.

To summarize, previous research concerning occupational safety and health in platform work emphasizes the precarious employment conditions. The uncertainty regarding platform workers' employment status creates an important OSH challenge: the ambiguity is closely linked to the question of who is responsible for the management of OSH – the workers, the platform, or the authorities? Despite this ambiguity, previous research has found that platforms and customers actively influence platform workers' work processes through different forms of control. One way in which this control is performed, is through customer evaluations, which can place stress on the workers to maintain a good rating to secure requests from customers in the future.

3.3 Methodology

A desk study, existing literature and semi-structured interviews provide the empirical basis for this chapter. The desk study is described in closer detail in [section 3.4](#). Altogether, I conducted eight interviews with a total of nine different interviewees. The interviewees included two representatives from a trade union organizing cleaners, a representative from the industry's tripartite sector programme and a regional safety representative. In addition, the manager of a traditional cleaning company that offers its cleaning services digitally was also interviewed. Finally, I interviewed four cleaners: two worked as platform cleaners, one was employed in a smaller traditional cleaning company in the private cleaning market, and one was employed in a larger cleaning company in the professional market.

The choice to conduct semi-structured interviews was based on the notion that they would provide insight into how digitalized work arrangements are carried out in practice and what anticipated and unanticipated working environment challenges such arrangements may create in the cleaning industry. Semi-structured interviews also allow for a relatively structured analysis and comparison of the data that has been gathered. One of the interviews was conducted in person, two were conducted through video calls on Teams and the remaining five interviews were conducted over the phone. For the interviews carried out in person and through Teams, relatively similar interview guides were followed. These were slightly adjusted to each interviewee and their role. The guides included questions on the outreach of platform work in the industry, working conditions and wages,

algorithmic management, OSH, the motivation for becoming a platform worker, representation, and prospects for the industry. This grouping of topics also provided the framework for the data analysis that followed.

As platform workers in the cleaning industry primarily offer cleaning services to private households, they do not have a set physical workplace. This makes them very difficult to reach – even more so than anticipated when the data collection was first initiated. The challenge of reaching cleaners prompted several methodological considerations. First, representatives of the social partners and the regional safety representatives were interviewed and asked whether they had communication with or links to any platform cleaners. Reaching platform workers through these interviewees proved very difficult. Most of them had great insight into the professional cleaning market but less into the private cleaning market and were quite distanced from cleaners who provide their services through digital platforms. Next, different cleaning companies were contacted directly. While the manager of one more traditional cleaning company agreed to participate, the platform companies did not have the time to participate in our research.

Some of the interviewees implied that the best way to get in contact with platform cleaners would be to book a cleaning appointment through one of the platform companies. I discussed this option with my colleagues but decided not to, based on ethical considerations. Spilda et al. (2022) recognize that platforms present a valuable tool for recruiting platform workers for research on the platform economy. Nonetheless, they emphasize that this recruitment approach presents important ethical concerns in terms of the workers' anonymity, informed consent and the transparency of the research. In discussing this recruitment option, I found it particularly problematic that it would include ordering cleaning services to private homes and decided to be fully transparent with the cleaners throughout the entire recruitment process.

Finally, cleaners were contacted directly, although not through the platform. I studied cleaners' profiles on Vaskehjelp, where they are presented with their full names, and used telephone directories to search for their phone numbers, subsequently contacting them directly through SMS. In these text messages, the cleaners were asked whether they would be willing to talk about their work for 20 to 30 minutes and were offered NOK 300 for their time. Out of the 16 cleaners that were contacted, three responded, and two were willing to participate in a telephone interview. As most cleaners work alone, the "snowball method", where one informant leads you the next, was unsuccessful. For the two cleaners interviewed who did not work for a platform company, one was reached through a personal contact and the other through the trade union representatives that were interviewed in the beginning of the project.

3.4 Digital platforms in the cleaning industry: emergence and extent

In the desk study, the website proff.no^[16] was used to provide an overview of platform companies in the Norwegian cleaning industry in terms of their size, when they were established, number of employees and which NACE code they have registered.^[17]

While the term “platform company” is ambiguous, it is used to describe companies with certain characteristics. To illustrate what distinguishes platform companies in the cleaning industry from traditional cleaning companies, Table 3.1 presents a simplified description of the characteristics of four forms of companies in the industry: a traditional cleaning company with employees, a self-employed cleaner who owns his or her own business, a platform company, and a hybrid cleaning company that uses digital arrangements for the communication and organization of the work yet employs the cleaners.

Table 3.1 Typology of cleaning companies and their characteristics.

	Has employees	Uses self-employed workers
Traditional work arrangements	<i>Traditional cleaning company</i> providing cleaning services through employed cleaners. Cleaners are therefore covered by the WEA and the generally applied collective agreement. Provides services in both the professional and private cleaning markets. The company/employer is responsible for equipment and supplies for the job.	<i>Self-employed cleaner owning his/her own business</i> providing cleaning services to enterprises and private households. Cleaners are not covered by the WEA and the generally applied collective agreement. Provides services in both the professional and private cleaning markets but most prevalent in the private cleaning market. The cleaner or the customer is responsible for equipment and supplies for the job.
Digital work arrangements	<i>“Hybrid” cleaning company using digital arrangements for the communication and organization of the work yet employs the cleaners.</i> Cleaners are therefore covered by the WEA and the generally applied collective agreement. Provides services in both the professional and private cleaning markets. The company/employer is responsible for equipment and supplies for the job.	<i>Platform company:</i> a “platform” for self-employed cleaners to get in contact with potential customers. Cleaners are not covered by the WEA and the generally applied collective agreement. Work is advertised and organized digitally. Primarily provides services in the private cleaning market. The use of customer reviews is widespread. The cleaner or the customer is responsible for equipment and supplies for the job.

16. According to the service itself, Proff is the leading Nordic search and evaluation service for companies, official enterprise information, roles, and owners (Proff, n.d.).

17. NACE is a statistical classification of economic activities in the European Community (Eurostat, 2023). Traditional cleaning companies are typically registered as “81.210 Cleaning of buildings”, or “81.290 Other cleaning services”, while platform companies are commonly registered as “82.990 Other business services not listed elsewhere”, or even “62.010 Programming services”.

Through the desk study, five companies were identified as either “hybrid” or “platform” companies: Vaskehjelp, Maidme, and Luado are typical platform companies, while WeClean and Freska fit better into the hybrid category. One reason for this, is that the cleaners who work for WeClean and Freska are employees. The companies differ in size and reach, but mainly offer cleaning services in more urban areas as this is where both the supply and the demand are the highest. As mentioned in the introduction, Vaskehjelp is used as a case of a platform company in this chapter as it is the most established in the Norwegian cleaning industry. This makes the company, and the cleaners who work for it, the most accessible for research.

3.4.1 Vaskehjelp

Vaskehjelp has emerged as a new actor in the largest Norwegian cities, competing with traditional cleaning companies (Valestrand and Oppegaard, 2022). The company was established in Trondheim in 2016 as a platform for self-employed cleaners, mainly directed towards the private cleaning market. To request cleaning services, the customer types in the address where the cleaning is to take place and is presented with a selection of available cleaners in the area in question. Each cleaner’s profile includes a picture and a short description, an hourly price rate, reviews from previous customers and the number of jobs they have carried out for the company. To become a “Vaskehjelp cleaner”, a person must establish a sole proprietorship and receive an organization number, establish a Vaskehjelp profile in the app and apply for an HSE card from the Labour Inspection Authority (Vaskehjelp, n.d. a).

The number of available Vaskehjelp cleaners in different parts of the country and their hourly price range, experience with the company and gender distribution were mapped out through the desk study, which also gave an impression of their age and background. For instance, some cleaners wrote their profile presentations in English, and others in Norwegian. Some presentations were also quite detailed in terms of background information and previous experience. [Table 3.2](#) provides an overview of the cleaners available^[18] on Vaskehjelp’s website in the country’s three largest cities – Oslo, Bergen, and Trondheim – in October 2023.

18. Here “available” implies all active profiles on the webpage, including the cleaners who are unavailable during the timeframe I have entered to reach the overview of the cleaners.

Table 3.2 Number of available cleaners divided by city, gender, and hourly price range (Vaskehjelp n.d. b).

City	Oslo	Bergen	Trondheim
Number of available cleaners	46	13	20
Hourly price range	401 to 750 NOK	399 to 749 NOK	407 to 720 NOK
Gender distribution	41 women, four men	13 women	17 women, three men

In the country's three largest cities, I found 79 cleaners working for the platform. On the website, the customer can sort the profiles according to price and rating based on previous customers' reviews. As the table illustrates, the range of price rates are quite similar in the three areas, although quite diversified within each area. While there are exceptions, cleaners who are new to the app and have fewer reviews and a lower number of previous jobs tend to offer cleaning services for a lower hourly price than cleaners who have longer experience. Cleaners who are new to the company are also labeled "new cleaner", and the company often offers a price reduction to help these cleaners get their first customers. According to one of our interviewees who worked for the platform, these price reductions do not affect the cleaners' wages.

The price the customer pays includes the cleaner's honorarium, insurance, value-added tax, and maintenance of the app (Valestrand and Oppegaard, 2022). The platform company also takes a set percentage of the price for having put the cleaner and the customer in contact. The app is designed in such a way that the cleaner cannot offer cleaning services for a lower price than the generally applied minimum wage (NOK 216,04). The company pays the cleaners the sum of all jobs carried out minus the company's share every other week. The payment takes place through the platform. Additional expenses, however, are not covered by the platform. As self-employed contractors, the cleaners carry costs such as the travel between jobs, workwear, their phones and the like, while the customer covers the costs of cleaning supplies and chemicals.

Through their webpage, Vaskehjelp also provides a guide on how to become a "Vaskehjelp cleaner". This information is available in English and Norwegian and was previously displayed as a step-by-step overview with a timeline of how to become a cleaner and advertise one's services through the platform. [Figure 3.1](#) provides an overview of these steps.

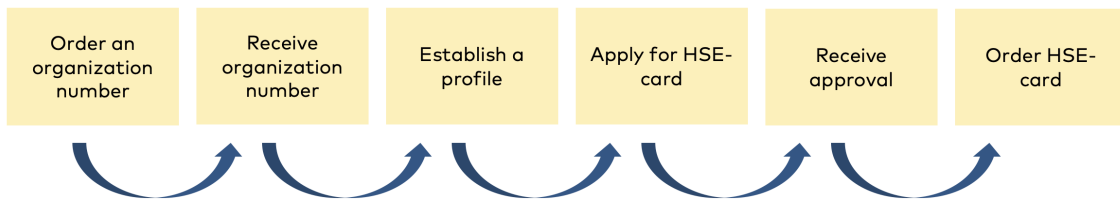


Figure 3.1 How to become a Vaskehjelp cleaner step by step.

The platform estimates that the entire process could take anywhere from six to sixteen days. The webpage also used to have links to Altinn and to the HSE card application form. In late 2023/early 2024, the platform modified this information, and it now provides an overview of what a potential cleaner would need to do: (1) establish a sole proprietorship on Altinn to obtain an organization number, (2) create a cleaner profile in Vaskehjelp and (3) apply for an HSE card from the Norwegian Labour Inspection Authority. Unlike before, the platform asks the cleaner to enter their full name and e-mail address to receive the step-by-step explanation.

3.5 Analysis: Platform work in the Norwegian cleaning industry

In this section, the empirical data is analysed and presented. First, we take a closer look at why cleaners choose to work for platform companies, followed by discussions of the platform companies' employer responsibility, working environment challenges that characterize platform work in the cleaning industry, and authorities' challenges in reaching this group of workers.

3.5.1 Why do cleaners want to work for platform companies?

Valestrand and Oppegaard (2022) argue that in a labour market that generally offers full-time positions, good working conditions and decent wages, one could expect that jobs with low and unstable income and long days, such as those available through platform work, become relatively less attractive. Nonetheless, they note that platforms have succeeded in getting a foothold in the labour market, partly by recruiting labour from the parts of the workforce that are often excluded from the stable and well-paid jobs that generally characterize the Norwegian labour market by offering formal flexibility, making the jobs more attractive than other work opportunities available to these groups.

This argument was supported by our interviewees from the trade union, the regional safety representatives, and the sector programme. They were of the impression that cleaners who take on jobs in the private cleaning market in general, and through platform companies in particular, do so because it is perceived as their

only option. The representatives from the trade union were concerned that foreign workers might take these jobs without being aware of what they involve. They highlighted that these workers might not be familiar with the Norwegian language and the composition of the Norwegian labour market, adding that many cleaners are forced into sole proprietorships without necessarily knowing what it entails in terms of the instability and unpredictability of earnings and working hours, and worker and social rights.

In contrast, both of our interviewees who worked as cleaners for the platform company emphasized the positive sides of being a platform worker, and especially of being self-employed. The cleaners particularly valued the independence it allows and the opportunity the company provides as an arena – or a platform – to reach new customers. One of them said: “I started to use the app because I was curious. Maybe to be sure that I had some extra money. If my own customers are passing [me] over. I heard about the company from other girls (...) It is a very nice opportunity to get extra jobs” (cleaner, platform company). Another cleaner explained: “I like the independence at Vaskehjelp. I like that I don’t have any managers. No one to supervise me. I speak directly to the customer” (cleaner, platform company).

The advantage of having formal flexibility and autonomy as a platform worker is a central argument used by platform companies to recruit new workers (Valestrand and Oppegaard, 2022; Jesnes and Oppegaard, 2023). In sum, the cleaners I interviewed also pointed to these factors as important reasons for being platform cleaners. In addition, they emphasize the arena the platform provides for becoming visible and accessible to potential customers.

3.5.2 The legal responsibilities of the platform companies

Platform workers are often legally regarded as operating their own business, but as their services are mediated through, and to a certain extent managed by the platform, discussions have been raised concerning the amount of employer responsibility the platform should take on. Hotvedt (2020) argues that the allocation of responsibility in platform work raises difficult questions, considering that both the platform and the customers may, in certain cases and depending on legal interpretations, be responsible for employer duties. The regional safety representative I interviewed stated that one important measure to secure better working conditions for cleaners would be to place more responsibility on the platforms by clarifying the cleaners’ form of employment.

As described above, the cleaners I interviewed who worked for the platform company valued the flexibility and independence of being a platform worker. The cleaners are free to choose the area they want to work in, to set their own hourly rate, to decline requests from potential customers and to suggest a new time and date if the request does not fit their schedule. Despite this flexibility, one of the

cleaners I interviewed also emphasized that the company does keep an eye on the cleaners and contacts them if they decline too many requests.

The cleaner had been contacted by the platform after choosing to be available for customers in a larger city centre after previously solely providing services in the city's surrounding areas due to traffic and road tolls. When they became available in the city center, the number of requests they received rapidly increased, making the cleaner unable to take on all the proposed jobs. The platform then reached out, wanting to know the reasons for the decline in their job acceptance rate. After the cleaner explained the situation, the company showed understanding but also suggested limiting the cleaner's availability in the city centre if the number of requests was too high, interfering with the cleaners' opportunity to choose. Both interviewees who worked for the platform company also informed us that the platform covers the cleaners with an accident insurance. One of the cleaners also told us that the company provides the cleaners with a digital library of videos and courses for workers to consult as desired and is willing to help them with their taxes if they have questions.

As Wiesböck et al. (2023) point out, platforms actively influence cleaners' labour processes, by monitoring declined jobs and interfering when the number of declined jobs is considered too high. The cleaners are classified as self-employed contractors and therefore not employed by the platform. However, the control performed by the platform affects the cleaners' autonomy. In addition, the platform provides accident insurance and digital courses and ensures that the cleaners are paid the generally applied minimum wage, not counting expenses such as travel costs and workwear. The employer responsibility the platform takes on in terms of insurance and wage determination all point to the questions raised by Hotvedt (2020) concerning the extent to which the platform is responsible for the cleaners and their working environments.

3.5.3 Working environment challenges

In the following sections, we take a closer look at different working environment challenges that characterize work as a cleaner for platform companies. These include customer reviews, work pressure and time management and risks faced by self-employed workers in general. While self-employment is widespread among cleaners in the private cleaning market, it has significant implications for workers' claim to social and labour rights. It must therefore be addressed in relation to other characteristics of platform work.

Customer reviews

On Vaskehjelp's website, customers can sort the available cleaners according to their set hourly price rate and their customer reviews. The customer reviews are presented as the percentage of previous customers who have given the cleaner a "thumbs up" for the job they performed. According to the cleaners I interviewed, the

platform asks the customers whether they would like to give the cleaner a thumbs up or not after the job is finished. On the website, you can also see the cleaners' number of previous customers and the number of jobs they have performed. If you look more closely at each individual profile, you can also read reviews in cases where previous customers have left comments.

Both our interviewees who were platform workers informed us that they had not yet received any negative feedback from customers and noted that they were very happy about this. One of the cleaners was under the impression that most customers take the time to give a thumbs up, and many also give feedback through comments on the cleaners' profiles. She added that if a cleaner rarely receives any feedback, their score will drop: "Some (customers) are silent and don't write anything. I think your overall score will drop if you don't maintain good feedback" (cleaner, platform company). Thus, these cleaners – like other platform workers (Wiesböck et al., 2023) – depend on customers' good feedback to maintain a good score on their profile, which again affects their opportunity to receive more requests in the future.

One of the cleaners implied that the reviews make it easier for potential new customers to trust the cleaners and to let them into their private homes. Reviews can make the cleaners seem more trustworthy, and hence attract future customers. Likewise, a lack of reviews, or negative reviews, can make cleaners seem less trustworthy, highlighting their dependence on reviews. The cleaner added that the accident insurance provided by the platform also counts for this trust element as customers know that the platform will cover the accident if the cleaner breaks anything during a job.

Work pressure and time management

The cleaning industry is labour-intensive, and Trygstad et al. (2018) described the work pressure in the industry as increasing. One of the cleaners I interviewed emphasized that cleaning is heavy work: "It is difficult, physical work, and work under pressure" (cleaner, platform economy). The cleaners also placed an emphasis on the transit time between jobs. The cleaners I interviewed who worked for the platform were not paid extra on the weekends or for the transit time between jobs. The time it takes to get between jobs varies, and the cleaners emphasized taking this into account when planning and accepting jobs. As previously described, cleaners can decline jobs, or suggest a new date or time if the request does not fit their schedule. According to the cleaners, a cleaning job usually takes three to four hours but can last anything from two to six hours. Three hours is the "default" when ordering a "standard cleaning service" on Vaskehjelp's website, but the customer can choose up to eight hours. The platform also suggests the time needed according to the size of the area the customer wants cleaned.

I asked the cleaners whether they felt stressed in their work, and both cleaners who worked through the platform answered that the work could be stressful but emphasized that being self-employed allowed them to manage their time as they

please, which is helpful for stress management. One of the cleaners stated that she was not stressed but was working under pressure. Cleaners' opportunity to manage their own time must be seen in light of the fact that it is the customer who decides the time frame. Both cleaners had experienced showing up at a customer's house and realizing that the job would take longer than the customer had anticipated. As the cleaners plan their weeks based on these jobs, they are reliant on finishing a given job on time to reach their next customer. Furthermore, they are only paid for the time frame that has been set, and the reliance on customer reviews is an incentive to finish the job within this window. One of the cleaners put it like this: "The stress is only in my head, that I must do as much as possible to get a good review and so on. I think it is ok" (cleaner, platform company). In cases where cleaners need more time than the customer has anticipated, they can ask whether the customer would like to expand the time frame for extra payment or whether they can prioritize parts of the job to finish on time.

When asked about stress, one of the cleaners also emphasized that not having enough to do can be equally stressful as having too much to do. She expressed that she had felt more stressed when she was new to the platform, being concerned she would not receive enough requests from potential customers. However, she experienced that her customer base grew quite fast and highlighted that while it can be demanding when there are many requests, she also feels content and motivated by this.

Working environment challenges related to being self-employed

One of the cleaners I interviewed who worked for the platform company also stressed some of the risks of being self-employed, especially the fact that one cannot receive compensation for sick leave before the seventeenth day of being sick. She once had to cancel a week of jobs when she got sick and had no legal right to compensation, being self-employed. Moreover, she added that this is something you agree to by being self-employed and that the company is very transparent on this matter. It is my impression that both platform cleaners who were interviewed were well informed and aware of their rights and obligations towards the platform company. The cleaner also added that while most customers are flexible about changing the time of the appointment if a cleaner gets sick, it can be difficult to find new dates due to the rotation of jobs for other customers who book cleaning appointments regularly.

The other cleaner who worked for the platform company explained that as a self-employed worker, you have a say in how the working environment challenges you are exposed to affect you. For instance, the cleaner emphasized that the risk to your health, for example, depends on what chemicals you use or how heavy you choose to lift. When providing cleaning services through Vaskehjelp, the customer is responsible for providing the equipment and cleaning supplies necessary for the job they want carried out. Both cleaners I interviewed who worked for the platform described having taken precautions to mitigate the potential negative effects of

using equipment and chemicals that can be harmful to one's health. For instance, both had encouraged their customers to choose milder cleaning supplies and chemicals: "I try to promote natural products. Cleaning chemicals can intensify the risk of asthma. I try to inform the customers, and we help each other. It is good for me, their homes and their families" (cleaner, platform company), one argued. Another highlighted: "If the customers use some of the cheaper chemicals that are bad for you, you can ask them [to change]. Everything is up to us. Some cleaners don't ask their customers, but the customers probably don't think about these things if you don't ask (...) If they like you and the job you do, they would like you to come back" (cleaner, platform company).

Nonetheless, to be able to influence these factors, cleaners must have the courage to discuss these matters with the customer, so one again must consider cleaners' dependence on good relations with the customer to ensure good customer reviews. In these cases, language barriers can also pose a challenge. The consequence of using harmful cleaning supplies was also pointed out by the cleaner I interviewed who worked for a smaller company in the private market:

The company I work for now is one of the best companies I have worked for. The only thing is that we don't get professional equipment, everything is bought from "Europris" [a discount retail store]. We need to use a lot of energy with such bad equipment. My back and wrists hurt. (cleaner, private market)

The above quote shows the importance of appropriate equipment to mitigate the risk of musculoskeletal injuries, considering that almost half of all cleaners report neck, shoulder and back pain, and that most of them say it could be due to their work (NOA, n.d.). Again, the choice of cleaning supplies and chemicals is not in the hands of the platform cleaners unless they demand better equipment from their customers.

Despite offering courses online, Vaskehjelp does not provide cleaners with compulsory OSH courses concerning the use of equipment and chemicals. Cleaners must therefore look up this kind of information on their own initiative. The regional safety representative I interviewed also emphasized this aspect. He stressed that the most prevailing working environment challenge for platform workers in the cleaning industry is that companies abdicate their responsibilities. He assessed that platforms do not provide training or information about protective equipment and chemicals. The regional safety representative put it like this: "The app companies are different from other cleaning companies in several negative ways – the cleaners lack insurance and information on asthma and allergies, they lack rights. They lose all rights one has as an employee" (regional safety representative).

Authorities' challenges

It was pointed out by several of the interviewees that there is a substantial difference between the private and the professional cleaning markets. They emphasized that they found it very difficult to get an overview of the private market, which is where the platforms mainly operate. The regional safety representative I interviewed argued that it is difficult to say anything about the private market at all:

We know it is big, but it is difficult to get an overview. There are many sole proprietorships, no company cars with logos for us to see where the cleaners are, no websites with information, and a lot of undeclared work. (regional safety representative)

One of the cleaners I interviewed who works in the private market had a lot of experience from various smaller, traditional cleaning companies. To illustrate the unpredictability in parts of the private market, she told us about the wage and working conditions that characterized her everyday working life when she first moved to Norway from an Eastern European country:

She [the employer] would pay us in cash, and we were driving our own cars. She did not pay for gas. I had nowhere to go, I needed the work. I expected her to give me a contract or something. She said, "now you will be paid 110 kroner an hour because of the taxes". But what taxes do you pay with undeclared work? (...) She was very smart. She had all these girls who did not speak English very well and were too scared to leave. (cleaner, private market)

The representatives I interviewed from the trade union shared this impression of the private market. They informed us that while the union density in the industry at large is quite low, most of their members are employed in larger companies in the professional market. One reason for this is that these cleaners are easier to reach than the cleaners in the private market. Another reason is that a larger share of the cleaners in the professional market are employed, in contrast to the private market where self-employment is more common, making cleaners in the private market more difficult to unionize.

Similarly, the representative from the tripartite sector programme described the private market as a "grey market" and acknowledged that the authorities and social partners who should have knowledge about the private market and the platforms who operate there do not. The sector programme has only recently started investigating the parts of the cleaning industry where platforms operate. The programme representative admitted finding it difficult to get an overview of this part of the market, partly because it is challenging to carry out inspections in private homes, making the cleaners who work for platforms very difficult to reach.

The scheme of regional safety representatives was implemented to secure OSH in the industry. Nonetheless, the regional safety representatives get their mandate from the WEA and therefore only visit companies with employees. For this reason, platform workers, who tend to be classified as self-employed contractors, are generally not covered by the scheme. The regional safety representative I interviewed told us that cleaners often are difficult to reach. The main reasons for this are language barriers and the fact that cleaners consequently do not know what regulations apply to them, or the rights to which they are entitled. The representative stressed that many cleaners often find it difficult to search for this type of information as many of them have only lived in Norway for a short period of time, often taking on cleaning jobs because they need the money. Very often, information on rights and duties are only available in Norwegian and English.

While platform workers generally are not part of these safety representatives' mandate, regional safety representatives get an impression of platform companies and the cleaners who work for them through their work in the private cleaning market. For instance, they meet platform cleaners when approaching cleaners in shopping malls and the like. When they ask to see the cleaners' HSE cards, some of them have a stack, as they work for several companies. In these cases, the safety representatives see that some of them carry HSE cards as self-employed cleaners – some of whom work through digital platforms.

3.6 Concluding discussion

The aim of this chapter has been to explore the risks and working environment challenges that characterize platform work in the Norwegian cleaning industry. In this concluding discussion, I review some of the most salient challenges that have been highlighted throughout the chapter. First, in line with Wiesböck et al. (2023), I find that a great deal of power is granted to the customers through the use of customer reviews. In the case of Vaskehjelp, customers choose whether they would like to give the cleaner a "thumbs up" for the job, which affects the cleaner's online score and thus prospective job opportunities and income.

Second, I find time management to be another working environment challenge platform cleaners face. Cleaners who work for platforms make their own schedules depending on pending requests from customers, how many jobs they need, how long each job will take, and how long it takes to commute it between jobs. It is the cleaner's responsibility to make sure that each job is carried out within the time frame decided by the customer. This again highlights cleaners' dependence on customers. While a cleaner can suggest extending the time frame for additional pay, or focusing on parts of the job, they must keep the need for a good review in mind. Leanerts et al. (2022) emphasize how maintaining a good rating, or dealing with the consequences of a bad rating, causes a lot of stress for platform workers.

As opposed to platform cleaning, traditional cleaning is not characterized by this specific stress element.

Third, platform cleaners are exposed to the same OSH risks as traditional cleaners, including work pressure, contact with water and chemicals, the use of airtight gloves, heavy lifting, working on their knees or with their hands above their shoulders and working alone. Nonetheless, it is the customer that is responsible for providing platform cleaners with equipment and chemicals, and the cleaners must then evaluate whether the equipment is adequate and safe for their health. The platform does not require cleaners to have the training necessary to make this evaluation as they are self-employed. If cleaners consider the equipment inadequate, they must dare to tell the customer themselves and ask if this can be changed, again keeping in mind the need for a good review.

Fourth, as self-employed workers, platform cleaners are excluded from the rights and benefits employed cleaners have through the WEA and the collective agreement. As the cleaning industry is largely made up of foreign-born workers, language barriers and lack of local knowledge mean that many cleaners might be unaware of the legal and economic consequences of self-employment. Becoming a cleaner who works for a platform company requires minimal prior knowledge about the occupation and the industry. One can easily find the information through the platform's website about how to establish a sole proprietorship, create a profile and apply for an HSE card. What is described as the main advantage of being a platform worker – the flexibility – might therefore also become the greatest disadvantage if cleaners do not know what it involves or how to manage it.

In sum, cleaners in general are exposed to work pressure, contact with water and chemicals over time, heavy lifting, straining work positions and working alone (NOA, n.d.; Trygstad et al., 2018). This is also true for platform cleaners. In addition, like many traditional cleaners, platform cleaners are generally classified as self-employed workers and therefore excepted from a number of labour rights and welfare benefits traditional employees are entitled to (Jesnes, 2019). Moreover, as emphasized by Lenaerts et al. (2022), while traditional employees and platform workers might carry out similar tasks, and be exposed to the associated risks, the risks are likely higher for the platform worker. One important reason for this is the working environment risks that accompany digital work arrangements, such as customer reviews – and the stress related to having to attain a good rating to secure jobs in the future. Ultimately, platform cleaners are exposed to a combination of the OSH risks that characterize the cleaning industry in general and risks associated with atypical forms of employment, in addition to OSH risks associated with digital work arrangements.

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Chapter 4

Is the helper always happy? Platform-based domestic cleaning in Denmark

Stine Rasmussen (Aalborg University)

4.1 Introduction

Platform work is often associated with the food couriers we see in the streets wearing pink, blue or orange clothes and bags, who deliver take away to customers, often by bike or scooter and at a rapid pace. However, this form of work has also made its entry into other areas of the labour market that are invisible compared to food delivery. One of these areas is domestic cleaning, that is, cleaning in private households. In Denmark several platform companies selling cleaning services through digital platforms have emerged in recent years. They differ from existing cleaning companies in that they do not see themselves as cleaning companies as such but merely as an online platform that connects cleaners with customers based on an automated matching algorithm. In this chapter I explore working environment challenges that may arise with such digitalized work arrangements. I am particularly interested in how platform companies in domestic cleaning use algorithms to manage workers, and how this form of control influences the workers' occupational safety and health.

This chapter first describes important characteristics in the Danish cleaning industry as a background for understanding app-based domestic cleaning. I then present the case I have studied, namely a Danish domestic cleaning platform called Happy Helper, my methods and the theoretical and analytical frameworks used. I conclude that cleaners working through digital platforms are exposed to occupational safety and health risks. Some of these risks are similar to the risks in the traditional cleaning industry, but some of them are connected specifically to the business model of the platform company.

4.2 The context: the Danish cleaning industry

Cleaning is carried out in many different places and areas of society including private homes and private firms, as well as public workplaces. In general, the cleaning industry is characterized by many small, often local, cleaning companies (self-employed people and businesses with few employees) as well as large companies (Rasmussen et al., 2016: 28). As was emphasized in the chapter on domestic cleaning in Norway, it is relatively easy to establish a business in the

cleaning industry in Denmark. Cleaners often have low or little formal education. While it is possible to work as an unskilled cleaner, formal education exists for work as a service assistant, house assistant, cleaning technician etc. According to a 2022 analysis from the employer organization Dansk Erhverv, less than two percent of those working in cleaning and window cleaning in Denmark in 2021 had formal cleaning education (Dansk Erhverv, 2022: 9). Around one third had primary school as their highest educational level and another 30 percent had vocational education. Cleaning staff with a formal cleaning education are more common in hospitals, nursing homes and day care institutions compared to other areas of the service sector (Dansk Erhverv, 2022: 9). Women and persons with a non-Danish background are overrepresented in the sector, in particular women with a non-Danish background (Dansk Erhverv, 2022: 6–9). Because the barriers to entry are low, this type of work functions as an entrance to the labour market for foreigners in Denmark (Refslund, 2014). Furthermore, part-time employment is widespread (Dansk Erhverv, 2022: 19) and the industry often lacks labour power (Dansk Erhverv, 2022).

When exploring the Danish cleaning industry, it is important to distinguish between cleaning in the public sector and in the private sector, where the conditions differ. In the public sector (state, regional and municipal workplaces), cleaning staff have traditionally been employed directly at the workplace and covered by collective agreements. These collective agreements regulate wages and working conditions for the cleaners. However, in recent years public authorities and municipalities have increasingly outsourced cleaning at public workplaces such as nursing homes and schools to private providers. When cleaning is outsourced, wages and working conditions may change or worsen because the cleaning staff are not covered by the collective agreements that were applicable when they were directly employed in the public sector. For instance, a recent Danish study compared a group of employees who switched from public to private employment due to government outsourcing with a similar group that did not experience outsourcing and found that outsourcing had a negative effect on employee income over time (Petersen et al., 2021).

Cleaning in the private sector involves cleaning at private companies and domestic cleaning. In private companies, cleaners can also be employed directly at the workplace, or the company can buy cleaning from a cleaning company. In the private sector in Denmark, collective agreement coverage is not 100 percent like in the public sector, but around 75 percent (Appel, 2020), and the private cleaning sector is known for a lower-than-average collective agreement coverage. Collective agreement coverage is difficult to measure precisely, but according to a 2013 study by Andersen and Felbo-Kolding, 59 percent of firms within the private cleaning sector were covered by collective agreements, and cleaning, together with agriculture and the hotel and restaurant industries, is the industry with the lowest number of collective agreements (Andersen and Felbo-Kolding, 2013: 121–123). Wages can be low for cleaners working without a collective agreement (Madsen,

2015; Refslund, 2015). The industry is also characterized by low union density (Ibsen et al., 2015) and widespread undeclared work (Korsby 2011), but the extent of it is difficult to estimate precisely. Undeclared work in the cleaning industry is more likely to take place within domestic cleaning and when subcontractors are used for cleaning tasks (Korsby, 2011: 17). Furthermore, there have been examples of illegal work in the industry (Korsby, 2011: 17). Therefore, cleaning, especially in the unregulated part of the private sector, seems to be characterized by insecure working conditions.

Over the last ten years, several domestic cleaning platforms have emerged in Denmark. Some are centred around cleaning in private homes (like Hilfr and Happy Helper) while others offer a wide range of on-location tasks such as craft work, moving assistance, dog walking, babysitting and cleaning (for instance MePLoy and Care.com). Most of these platform companies are Danish-owned and, in the beginning, they primarily used a freelancer/independent contractor model in which they do not consider themselves an employer but merely a mediator between a customer who wants to buy a cleaning service and a provider who offers to do the cleaning task. This business model differs from traditional cleaning companies in the industry because these new companies do not see themselves as cleaning companies as such but merely as online platforms that connect cleaners with customers based on an automated match.

The platform company Hilfr has received the most public attention in Denmark. This company was the first cleaning platform to enter into a collective agreement with a union in 2018, which resulted in a lot of media coverage. Now, Hilfr has a combination model wherein the "Hilfr" (which is the term used for the cleaning provider) starts as a freelancer, sets their own prices and is paid per cleaning task. When the Hilfr has worked 100 hours through the platform, they are offered employment directly at the company and are covered by a collective agreement, which mandates an hourly wage, a minimum income of at least 152 Danish kroner (around 20 Euros), savings for pension and holiday payments and the right to sick pay. The concept is called "Super Hilfr". The Hilfr is automatically transferred to the employment model unless she or he actively chooses to continue with the freelance model (Hilfr n.d.). According to a Danish study of Hilfr, the Super Hilfr concept quickly turned out to be attractive. In 2019, more than a third of all cleaning tasks at the platform were carried out by Super Hilfrs, and in 2022 two thirds. However, only 70 people were employed as Super Hilfrs in 2022 (Ilsøe and Larsen, 2022: 74–75), which indicates that the number of people working through the platform is limited. From this study, we also know that the platform owners believe that this model has been an asset for them, among other things because it has helped promote their brand as a socially responsible platform company. However, they find the business model difficult to maintain because they are competing with other platform companies that use the freelancer model and because the sector is characterized by a lot of undeclared work (Ilsøe and Larsen, 2022: 75).

4.3 The case: Happy Helper

In this article, I analyse Happy Helper, which is the largest platform company in the Danish domestic cleaning market. In addition to domestic cleaning services, Happy Helper also offers move-out cleaning and cleaning of smaller commercial offices. According to the Happy Helper website, 4,500 helpers are associated with the platform (as of March 2024), and they operate in all major cities in Denmark.

Happy Helper was founded in 2015 by a group of Danish entrepreneurs who, inspired by Uber's business model and other American platform companies, noticed that domestic cleaning in Denmark was often unregulated and informal and saw a market in domestic cleaning. In the interviews, management told me that they believed that, with their business model, they could formalize some of the informal work in the industry. They established a freelance model, wherein the company presented itself as a digital platform connecting customers who need cleaning services with independent providers offering cleaning services based on an automated match. They named the service providers "helpers". The management at Happy Helper argues that the advantage for the helpers when they use the platform instead of operating independently is that they do not have to find customers on their own but can connect with customers through the platform. Furthermore, both the helper and the household goods are covered by insurance. Moreover, the helpers have the possibility to contact a live support team in case anything happens while working at a customer's house.

According to the management, Happy Helper had a reasonable turnover in the first couple of years and experienced a demand from both customers and cleaners who were interested in the concept. However, the company struggled during the Covid-19 pandemic because, as the management said in our interview, "people became afraid of letting people into their homes" and fewer cleaning providers were interested in working in private homes. At one point the company closed the access for new helpers to ensure that there was enough work for existing helpers. After the pandemic, the company became more economically stable despite having only half its previous turnover. However, in April 2024, Happy Helper announced that it had gone bankrupt (Pedersen, 2024). Shortly after, another platform company, HandyHand, bought the company and has stated that it intends to carry on the concept (Weis, 2024). Handy Hand is a Danish-owned platform company that offers a wide range of domestic work tasks (lawn care, furniture collection, dog walking, painting etc.).

4.4 Methods

The analysis is based on a qualitative research approach that combines interviews with the company management and cleaners working through the platform with existing data sources, such as information from the Happy Helper website, company reports, news articles etc. I also got access to an online community for "helpers" and the support team. Approximately 800 helpers are associated with this community and in the online forum I could follow questions, especially from new helpers, about how the Happy Helper business model works and learn more about the communication and sharing of information between the support team and the cleaners. Access to this online community has served as a supplement to the interviews. [Table 4.1](#) shows an overview of the data.

Table 4.1 Overview of data

Source	Type of data	Relevance
Interviews with management	Two interviews (CEO and Head of Support)	Data about the platform's business model, working conditions and OHS
Interviews with cleaners	Three interviews (more experienced "premium helpers")	Data about the platform's business model, working conditions and pay, and health and safety issues
Online community	Discussion forum on Facebook	Discussions among cleaners about how to set prices, how to handle tax payments, how to accept bookings, how to behave during cleaning, cleaning hacks etc. and discussions between cleaning providers and the support team
Documents	Information from Happy Helper website	Mainly information about the business concept + several guides and FAQs aimed at both customers and cleaning providers
Documents	Media articles	
Documents	Annual reports	Reports about the company's economic situation and managerial decisions
Documents	Afgørelse fra Konkurrencestyrelsen	Verdict prohibiting the company from setting minimum prices

In the period of April to June 2023 I conducted a total of five interviews, two with management and three with helpers working through the platform. The management was approached by email and the helpers were approached through the online community where the management allowed me to look for interview subjects. I made several posts in the online community but was only able to reach three cleaners. The fact that I was not able to reach more cleaners is a limitation of the study, but the cleaners that did sign up had experience working through the platform. Furthermore, I was able to get supplementary data from the online community, where more helpers engaged in discussions that also gave me valuable and relevant information despite not being interviews.

All interviews were conducted online. The interviewed helpers were all located in Copenhagen and had experiences with cleaning there. The interviews with the cleaners followed a semi-structured interview guide; I asked about their background and motivation for working through the platform, their pay and working conditions, their knowledge about algorithmic management, health and safety issues and representation/union involvement. The interview guide was inspired by the work characteristics of digitalized platform work identified by Ropponen et al. (2019; see also Jesnes and Rasmussen, Chapter 5 on food delivery in Denmark and Norway). During the interviews, I tried to learn more about job insecurity, time pressure, isolation, competition, harassment and unfair treatment, among other topics. The interviews with the management representatives covered the company's history and business model, including algorithmic management. The interview with the head of the support team was centered around the communication between the company and the cleaners.

All interviews were transcribed, carefully read through and subsequently coded. I combined open and closed coding. In the closed coding, I was inspired by the work characteristics mentioned by Ropponen et al. (2019), but I also allowed for codes to emerge from the material. For instance, in this process I learned that waiting time and competition are not central work characteristics of domestic cleaners compared to food delivery couriers, but isolation seems to be more pronounced. Furthermore, the contact and communication with both the support team and customers seem to matter more for domestic cleaners compared to food delivery couriers.

To ensure anonymity, especially for the cleaners, I have chosen a strategy in the analysis where I refer to what has been said in the interviews rather than using quotes, and when I use quotes, I do not indicate which interview they are from.

4.5 Analysis

I begin the analysis with a description of the business model at Happy Helper, including the process from the time a cleaner decides to offer cleaning through the website through the booking and finally to when the cleaning is completed. This

business model is important for understanding the second part of the analysis which deals with the central work characteristics and the working environment challenges associated with app-based cleaning in private households. My focus is on the following work characteristics: job and income insecurity, time pressure and overtime, the physical work environment, unfair treatment and isolation.

4.5.1 The business model

Most of the cleaners working through the platform are foreigners. When browsing through the profiles on the website, we see that most cleaners have English profile descriptions and non-Danish backgrounds, which is in line with the general trend in the cleaning industry described earlier. Like in app-based food delivery (see Jesnes and Rasmussen, [Chapter 5](#)), the barriers to entry in the field are quite low. People who want to work for the cleaning platform can register on the website with personal information, a Danish bank account and phone number and a clean criminal record. They watch an introduction video, complete a quiz and attend an online onboarding meeting with the company. According to the management, these meetings are used to check whether the cleaner has the skills to communicate with clients and is punctual. However, no previous experience with cleaning is needed. When the helper is approved by the company, they mark on a calendar when they are available to work. Because they are freelancers and not employees, they also set their own hourly rate, which is visible on their profile on the website/app and can be viewed by customers during the booking process. Although cleaners set their own prices, the company provides some guidance regarding reasonable pricing. According to the management, this guidance is designed to help cleaners set prices that are neither too high nor too low, as well as to help them be transparent with customers regarding what they can expect from the cleaner in terms of experience and quality. The platform has therefore developed a set of categories ("new helper", "standard helper", "premium helper" and "pro helper"), and when the helper decides on a certain hourly price, she or he is automatically placed in one of these categories, which is then also visible on their profile. A new helper has the lowest hourly price (around DKK 145/EUR 19) while a standard helper costs a little more (DKK 175/EUR 23) and premium helper costs the most (DKK 235/EUR 31). The pro helper category is the most expensive and is reserved for professional cleaning companies that bring their own cleaning supplies, which are also allowed to operate through the website. On the website, the company states that the new helper category is for new cleaners that do not have any reviews, which is why they have the lowest hourly rate. Customers are encouraged to help these cleaners by making a list of work tasks, because they are less experienced, and evaluating them after the cleaning. A standard helper "can do any cleaning task and is often the best choice for a domestic cleaning" while premium helpers are the ones with the most experience and the best ratings, which is why their hourly rates are higher and the customer can expect a higher quality cleaning (Happy Helper, n.d.). New cleaners cannot choose the premium category as a starting point (Happy Helper, n.d.).

Beside the hourly price, customers are also charged a service fee that ranges from 15 to 35 percent of the hourly price depending on how often the customer uses the platform. If a customer uses the platform weekly, for example, the fee is 15 percent, but for a single cleaning, the fee is 35 percent (Happy Helper, n.d.). Happy Helper previously set the minimum rate at 120 Danish kroner (16 Euros). In 2020, however, the Danish Competition and Consumer Authority stated that minimum prices are not allowed when using the freelance model because it can limit the competition between freelancers (Konkurrence og Forbrugerstyrelsen, 2020). Following this decision, the company developed its new concept with categories.

When customers book a cleaning through Happy Helper, they enter the platform's website and type in the time and date for the cleaning, the physical location and how many square metres need to be cleaned. Based on the area registered, an algorithm calculates a duration for the booking. This is similar to the Norwegian case of Vaskehjelp discussed in [Chapter 3](#). The customer is then directed to a page where they can choose between available helpers and are provided information on their hourly prices, the helper category they belong to and reviews/ratings from previous cleaning jobs. The customer then chooses a helper, and a booking request is sent. The helper can accept or reject the requested booking. The booking must be accepted within 24 hours. If not, it will be offered to another cleaner. The guidelines published on the website state that the company is allowed to "deactivate" a cleaner's profile if they do not respond to requests (Happy Helper, n.d.), although they do not specify how many requests they can decline before being deactivated. Furthermore, the website states that a cleaner's profile can also be deactivated if they arrange cleaning with customers from the platform outside the platform (Happy Helper, n.d.).

When a booking is accepted, the helper becomes responsible for communicating with the customer, which can be done through the app. I have not been able to determine whether cleaners can communicate with customers by phone, but the guidelines on the website encourage cleaners to arrive in advance of their appointment to talk with the customer about their expectations for the cleaning, which suggests that most communication happens at the start of the appointment (Happy Helper, n.d.). On the day of the booking, just before the booking starts, the helper checks in on the app. This is important for the cleaner to get payment. The cleaner checks out when the cleaning is done. Compared to food delivery couriers (see Jesnes and Rasmussen, [Chapter 5](#)), cleaners generally have more contact with the platform/support team, which was confirmed in the interviews. For instance, if a cleaning takes more or less time than what was agreed upon, the cleaner must notify the support team, which must then correct the payment. Live support can also assist in the case of a dispute. According to the interviews, management also perceived the live support team as an important service for the helpers.

In terms of cleaning supplies, the customer must provide supplies for the helper. The website lists the cleaning supplies and equipment that customers should have

(Happy Helper, n.d.). However, the interviewees explain that they often bring their own in case something is not available the house, or if they prefer using their own supplies (for instance special gloves).

4.5.2 Job and income insecurity

All the cleaners interviewed worked part-time through the platform for between five and 20 hours per week. Two of them also worked other jobs to have a level of sufficient income. They explained that they worked for the platform because it was difficult to get a job in Denmark with their educational background. They all had a non-Danish background. I observed the same tendency on the website when looking through the profile descriptions, where several cleaners mentioned that they had completed higher education but did not currently work in their field of study. The three interviewees were not students, but many cleaners indicate on their profile description that they are students and I therefore assumed that some of the cleaners used this type of work as a part-time job in conjunction with their studies.

The three interviewees explained that they had also chosen this type of work because they liked the flexibility the platforms offer. The appeal of flexibility is also noted in other studies, for instance in Jesnes and Oppegaard (2023), who studied food delivery couriers and Uber drivers in Norway. However, they were all aware of the insecurity associated with this type of job where they do not get paid for anything but the cleaning task and they all considered this a disadvantage.

All interviewed cleaners were categorized as premium helpers, meaning that they are more experienced cleaners, have better reviews and that they have set their hourly prices higher than other cleaners. They explained that they decide the prices on their own, but once they have decided on a price, they are automatically put into one of the categories, as one interviewee explained: "Well, I kind of fell into that category after I raised my hourly price" (female cleaner). This category is also shown on their profile on the website. One interviewee explained: "So, they don't really decide my hourly price. They do try to influence it a lot though". This is different from traditional cleaning companies that decide prices on their own.

All three interviewees explained that they do not decide the length of their working time on their own. The time spent cleaning for a particular customer depends on what the client has registered on the website, but the minimum amount of time for one client is 2.5 hours, which is equivalent to a home of approximately 60 square metres. Hence, when accepting bookings, cleaners normally accept the number of hours that is calculated based on what the client registers when they make a booking request. Sometimes they only have one booking a day and sometimes they accept more than one booking depending on the length of each booking.

Compared to the food couriers at Wolt, for instance (see Jesnes and Rasmussen, [Chapter 5](#)), platform workers in domestic cleaning seem to have more predictable working hours or working days because they mark when they are open to accept

bookings in advance on the calendar in the mobile application. This procedure resembles the shifts at Foodora and Just Eat, but without the peak time. However, all of the cleaners experienced cancellations from time to time, so they could not always rely on having work when they expected to. Furthermore, they are not compensated if a client cancels an appointment. This is also different from the traditional cleaning industry where cleaning companies normally charge the customer a fee if they cancel an appointment or want to make changes close to the day that was originally agreed upon. One of the interviewees, who had been working through the platform for a while, told me that there used to be a cancellation fee, but that it was deemed a breach of Danish consumer law and the company therefore stopped collecting it. Her experience was that “basically there is more risk for the helpers now. We show up, ring the bell and no one opens” (female cleaner). The cleaners are not compensated for their transportation expenses, either, if they are on the way when the cancellation is made. All of them emphasized that they had regular customers who booked their services often. This gave them a sense of stability because they knew some of their working hours in advance. According to the Happy Helper management, there are incentives for customers to book cleanings on a regular basis because the service fee depends on how often they book cleaners through the website. If they order just one cleaning, they pay a certain service fee but when they make more bookings (for instance once a week), the fee lowers. The management claimed that this was done to ensure that cleaners can get more regular bookings.

4.5.3 Time pressure and overtime

In the case of the food couriers in Denmark and Norway discussed in one of the previous chapters, waiting time was a significant work characteristic, but in domestic cleaning, time pressure and working more than what is agreed upon are more of an issue (see also Huseby, [Chapter 3](#) on cleaning in Norway). All the interviewees talked about time pressure, especially in the beginning when they were less experienced. The issue is that the algorithm that calculates the cleaning time does not consider anything but the size of the home (the number of square metres registered on the website), but the cleaning can take a longer time if the house is really messy, if there are two bathrooms, a large kitchen, windows that need cleaning and so on. The management at Happy Helper is aware of this challenge – “So, it’s always a little difficult to take the nuances into account” (Management interview) – but they claimed that they always encourage cleaners and customers to “enter into a dialogue about the tasks and priorities that exist so that it becomes a good experience for both parties” (Management interview) and if the helper can see that he or she cannot finish on time, they must ask the customer to pay for additional time. Management also encourages helpers to contact the live support team if they are engaged in this type of negotiation with the customer and they need assistance, and they do mediate in these matters from time to time. The helpers confirmed that they regularly use the support team.

Two of the interviewees shared that they negotiate with customers if they experience that there is a mismatch between the hours they have been booked for and what they are expected to clean and that they normally find a solution, whether it is being paid for more time or not cleaning everything that the client wanted. However, one interviewee explained that during her first years on the platform, she tried to go into these negotiations but found them too difficult and therefore she has made it a habit to check the size of the house in the Danish building and housing register and if the size of the house does not match what the customer has registered, then she will not accept the booking:

I would just end up going and talking to the person face to face, and they are like "oh but it is not so dirty. We keep it tidy", and I think well, you have splattered and greased kitchen walls, but I can't say these things right in your face, right? After a while trying to communicate with these people, I thought it was a waste of time, because it was very rarely I could make them see the light, so you know, when you get a booking, you get a notification on the app and either have to accept or reject it. I would get a booking. I would see the address and look it up in the system and ok, something doesn't match here, and I would just reject it. I wouldn't even go into that back and forth because it is fruitless. (female cleaner)

A related issue is that the cleaners depend on good reviews because new clients will read these reviews on the website when they book a helper. One interviewee explained: "You have the massive review pressure, because if you don't get a good review, you don't get more jobs. Even though you don't have enough time, because you have to get a good review" (female cleaner). She is often booked for too few hours because the algorithm's calculation is too simple, but because she finds it difficult to negotiate with customers and because she is dependent on good reviews to get more bookings, she often works more than what is agreed upon.

4.5.4 Physical work environment and unfair treatment

All the cleaners I interviewed explained that the work is physically demanding. One interviewee had back problems because the vacuum cleaners are not always adapted to his size and another described that she is not able to work the same hours as she did in the beginning because of physical pain. One had gotten chemicals on his hands because the gloves he used would often break.

Even though the customers must provide cleaners with the proper cleaning supplies and equipment, the interviewees reported a lack of proper cleaning supplies from time to time, which posed a risk to their occupational health and safety. This was also the case for the Norwegian platform Vaskehjelp discussed in the previous chapter (Huseby, [Chapter 3](#)). The interviewees from Happy Helper told me that sometimes customers do not have supplies, like oven cleaner or limescale cleaner or

even a vacuum cleaner. One interviewee described how she used a broom and wet wipes to clean a floor because the vacuum cleaner was broken. Not only do incidents like these worsen the physical work environment, they can also lead to disputes with customers. One interviewee told us that he normally offers to order the cleaning supplies through a grocery delivery app if he learns that the customer does not have the right supplies, but one time a customer refused and asked him to clean with the supplies that were in the house. Afterwards the client complained about the cleaning and wanted a refund. The interviewee was asked by the support team to document that he had done the cleaning properly but he did not want to use time documenting his work so he told the support team that they could refund the money to the client. The company ended up paying some of the expenses and the interviewee thought that this was a way of showing their support for him. While this interviewee did not say it directly, this example can be interpreted as a case of unfair treatment.

4.5.5 Isolation

Two of the cleaners that I interviewed found the work to be lonely because the cleaning tasks are normally performed alone. Sometimes customers can book two cleaners at the same time, but because they are so busy, they often do not interact. This interviewee had experience from app-based food delivery, for which he had an employment contract, and compared the two jobs; he thought that the relationship between food couriers was more collegial. He wished for another job with more interaction. Another cleaner emphasized a more generalized feeling of being invisible:

You are invisible not only for the client, but also for society. I am in this unregulated grey area. It has also eroded my self-esteem, like mentally it is awful. Also, because you are literally not interacting with anyone. You are just scrubbing and just. Everybody is at work. You don't meet anyone. (female cleaner)

On a related note, the interviewees all expressed concern about working alone in other people's private homes. Two of them said that they preferred business customers because they found it intimidating to be working in people's homes, and the female interviewee felt especially vulnerable because of her gender. A similar point is made in a recently published Danish study about working environment challenges for young people working for digital platforms (Nielsen et al., 2024). Nielsen et al. emphasize that cleaners feel insecure about working in private homes because platform companies do not check who the customers are and customers can therefore hide behind digital anonymity (Nielsen et al., 2024: 66–67). The point about females feeling vulnerable because of their gender is also present in their study, where the female interviewees link their insecurity to their position as females working in low status jobs (Nielsen et al., 2024: 67).

The management was aware of the challenge with isolation, and they explained that they have established different online communities for helpers, where they can talk with each other as well as with the support team because they know that the work can be lonely and there is a need for connection. One example is the online community on Facebook, which I got access to.

One of the interviewees also talked about union membership and representation. He had been to meetings organized by a union because he also worked as a food courier, but he believes that it is difficult to mobilize and organize domestic cleaning platform workers because they perform the work alone and have no colleagues to talk to. A study on app-based domestic cleaning in Germany had a similar finding (Niebler and Animento, 2023). This perception was confirmed by the management at Happy Helper, who also reflected on the lack of unionization and mobilization in the sector. The manager said he wouldn't mind if helpers started mobilizing and making more demands because he would see it as a sign that this type of work is valuable, and he would like to enter into such a dialogue. However, this has not happened in his experience because the group is fragmented, cleaners rarely speak to each other and nobody dares to speak up. They have tried to arrange meetings where helpers could speak more freely but it has proved to be difficult.

4.6 Conclusion

In this chapter, I have investigated working environment challenges for cleaners working through the cleaning platform Happy Helper, which is one of the largest platform companies in the domestic cleaning sector in Denmark. In addition, I have focused on understanding how the company uses algorithms to manage workers and how this affect their occupational health and safety.

Like the chapter on food delivery couriers in Denmark and Norway (Jesnes and Rasmussen, [Chapter 5](#)), I have used the analytical framework from Ropponen et al. (2019) to guide my empirical analysis. Ropponen et al. have identified several job characteristics that apply to workers in digital work arrangements that can threaten their occupational health and safety, and these characteristics seemed like a fruitful point of departure for understanding my empirical data in the cleaning case. But – like in the food delivery analysis – I have also been aware of the empirical specificities of my particular case and data, which can add to the framework of Ropponen et al. (2019).

First, I found that job and income insecurity were issues for the cleaners because of the freelancer model, where workers are paid per task. As in the food delivery case, the cleaners are torn between the flexibility of the work, which they like, and the insecurity in terms of income. Compared to workers in the food delivery industry, workers in the cleaning industry may be even more exposed to low earnings because customers can cancel their bookings, in which case they are not compensated; when bookings are normally for a number of hours, the loss of income is significant.

Second, I found that waiting time was not a significant work characteristic of domestic cleaners, but time pressure and working overtime were, especially for new cleaners. Furthermore, time pressure and working overtime seem to be connected to the way the company uses algorithms to manage the workers and to the functioning of the business model, in which customer reviews are central. The algorithm calculates a cleaning time, which is often too short, and cleaners find it difficult to negotiate with the customers about adding time because of the difference in their status; thus, cleaners risk getting trapped in a vicious circle whereby they continue to work more than what is agreed upon because they are dependent on good reviews in order to get more bookings.

Third, I found that cleaning is also a physically demanding job, which can affect the occupational health and safety of workers. In the chapter on the Norwegian cleaning platform (Huseby, [Chapter 3](#)), the issue was mainly the danger of the supplies used, which was not brought up as an issue in this case. Here, it was more about physical strain and pain as the result of using cleaning equipment that was not adapted and about disputes when the cleaning was not done properly because the customer didn't have the right equipment or supplies. In this regard, I also noticed that the cleaners did not bother arguing with customers who were not satisfied with the cleaning. In such cases, cleaners may lose income if customers do not want to pay for a cleaning that they are not satisfied with. For several of the interviewees, there seemed to be an awareness of their low status that made them hesitant to make demands on the customer (to have the right equipment and supplies or to negotiate about the time needed to do the job properly), keeping them in an unhealthy work situation.

Lastly, I found that competition was not an issue, as Ropponen et al. (2019) found, but isolation was. I found that the interviewees felt isolated and insecure about working alone in people's private homes and some had a more generalized feeling of being invisible. Furthermore, cleaners as a group do not seem to be able to mobilize in the same way as food couriers which keeps them in a position where they are not able to secure better working conditions.

All in all, my empirical data shows that cleaners working in app-based domestic cleaning in Denmark are exposed to significant safety and health challenges. The work is economically insecure, physically demanding and can be mentally stressful, like we also saw in the case of food couriers (Jesnes and Rasmussen, [Chapter 5](#)), but isolation and a feeling of being insecure and invisible were more prevalent among cleaners. Some of the challenges that cleaners in app-based domestic cleaning face are similar to those faced by cleaners in the traditional cleaning industry but others appear to be connected to the fact that the service is managed through a digital platform, especially the vicious circle described before wherein cleaners continue to work under inferior conditions because of the way the algorithm and the review system function.

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Chapter 5

The bitter aftertaste of app-based food delivery

Kristin Jesnes (Fafo) and Stine Rasmussen (Aalborg University)

5.1 Introduction

Purchasing food from restaurants and grocery stores and having it delivered to your doorstep is convenient and has become popular in the Nordic countries. Foodora, Wolt and Just Eat are the platform companies dominating the Nordic market. These companies use the digital infrastructure of a platform to coordinate supply and demand (Srnicek, 2017) and usually classify their couriers as independent contractors or use other non-standard forms of employment (Jesnes, 2024). These working arrangements deviate from the standard employment relationship prevalent in the Nordic countries (Rasmussen et al., 2019), raising concerns about the couriers' working conditions and their health and safety.

In this chapter, we investigate working environment challenges that may arise with digitalized work arrangements like app-based food delivery in the Nordic countries. We are particularly interested in how app-based food delivery companies use algorithmic management techniques to control couriers, and in what ways this affects couriers' occupational safety and health. We build on three case studies of app-based food delivery companies in Denmark and Norway, Just Eat, Foodora and Wolt, that use different forms of employment. We have conducted interviews with couriers, platform companies and union representatives, as well as desk research and document reviews.

First, we present our theoretical framework, wherein we define how we understand algorithmic management and which dimensions of working environment challenges we focus on in our empirical analysis. Then we present our methods and describe the empirical cases and, finally, share our analysis and conclusion. We argue that app-based food delivery work is insecure, physically demanding and mentally exhausting, but we find differences in how couriers cope with these challenges. Furthermore, working environment challenges seem to be connected to type of employment arrangement, with some business models putting couriers more at risk than others.

5.2 Theoretical framework

In this chapter, we explore working environment challenges for couriers with different employment statuses working in app-based food delivery. We have a special interest in companies' use of algorithmic management and its impact on couriers' occupational safety and health (OSH).

First, we define algorithmic management as "a system of control where self-learning algorithms are given the responsibility for making and executing decisions affecting labour, thereby limiting human involvement and oversight of the labour process" (Duggan et al. 2020: 119). The platform companies we are looking at are known for changing the way the algorithmic management system is set up or other elements of how they organize work, referred to as intraplatform algorithmic changes (Mendonça and Kougiannou, 2023), which may alter working conditions and pay from one day to another. We view algorithmic management as an extension of companies' growing reliance on field technology (see Oppegaard and Bråten, [Chapter 2](#)) but with a shift towards automated decision-making in areas traditionally handled through human interaction. This implies that algorithmic management is not something entirely new but rather a continuation of a trend towards using field technology for recording and accessing information about couriers in remote work with the aim of controlling them.

Second, we define our understanding of working environment challenges. Here, we are inspired by Ropponen et al. (2019), who reviewed the existing literature to explore features of digitalized platform work and their influence on OSH. As a theoretical framework for their review, they used the job demands-resources (JD-R) model, which explains why stress, burnout and health-related problems occur (Demerouti et al., 2001). The JD-R model groups work characteristics into job demands – requiring sustained physical or mental effort such as noise, time pressure or a heavy workload – and job resources – aspects of the work that are functional for work goals or that stimulate personal growth, such as autonomy, participation in decision-making or task variation (Demerouti et al., 2001: 501). While being exposed to extreme job demands can lead to exhaustion and burnout in the long run, job resources can have the opposite effect, creating a motivational process that leads to work engagement and well-being at work (Demerouti et al., 2001).

Job demands and job resources vary across different occupations and contexts. Ropponen et al. (2019) applied this framework to platform work, exploring online platform work and on-demand platform work where jobs or tasks are assigned online but carried out physically (Ropponen et al., 2019). Based on a review of the existing literature they identified different job demands (e.g., job insecurity, a strenuous physical work environment with time pressure, harassment, isolation, competition etc.) and job resources (e.g., task variety and opportunities to develop

competences) and discussed how they are connected to the health, well-being and safety of platform workers. They observed extreme variations in platform work, ranging from situations with high demands and many resources to situations lacking both. They concluded that there is a need to balance job demands and job resources for platform workers to stay healthy, well and engaged (Ropponen et al., 2019).

We structure our empirical analysis around several characteristics of platform work. Some of these were identified by Ropponen et al. (2019), but we also add some that we find pertinent based on our empirical analysis. The categories we use from Ropponen et al. (2019) are as follows: job insecurity, time pressure, physical work environment, harassment, isolation and competition. We add income insecurity (which we understand in connection to job insecurity) and waiting time, which we found important when analysing our data.

5.3 Methods

The analysis of the cases from both Denmark and Norway is based on data collected through interviews with bike and moped couriers (not couriers with cars), management from the platform companies and union representatives and dialogue with representatives of the labour inspectorate, as well as a desk review of relevant documents (see [Table 5.1](#)). The analysis is primarily based on the courier interviews, and we use the other interviews and the document review to support it.

In 2022 and 2023, we conducted ten interviews in Denmark and 12 in Norway. Representatives from trade unions and management were recruited via e-mail, and we used various methods to recruit couriers for the interviews. In both countries, couriers were approached outside popular restaurants (so-called hot spots) in Aalborg (the fourth largest city in Denmark)^[19] and Oslo. We provided prospective interviewees with information sheets stating our research aims and asked if they would like to participate in the project. This process was time-consuming due to challenges with reaching the couriers: some did not speak the local language or English, others were in a rush, and some showed no interest. In Denmark, some of the couriers had time to do the interview when we met them, but most interviews were scheduled for later at a place and time convenient for the couriers. The couriers who also served as union representatives were recruited through e-mail, and we also used the snowball method to reach more couriers. In accordance with courier preferences, interviews were held face-to-face, over phone or video calls or via e-mail. Follow-up discussions were conducted via e-mail or in-person meetings as needed.

19. Aalborg was chosen because the Danish research team is based there. Several of the interviewees, however, had work experience from the capital, Copenhagen, or other cities and talked about these experiences in the interviews. The main implication of conducting interviews in Aalborg instead of the capital is that there might be less competition and less time pressure because there are fewer customers ordering takeaway than in larger cities.

In the courier interviews we used the same semi-structured interview guide in the two countries covering topics such as the couriers' background and previous labour market experiences, their motivations for being a courier, their working conditions and pay, their experience with and perceptions of algorithmic management, health and safety issues and representation/union involvement. In the interviews with management, we used the same semi-structured interview guide with questions about the company and its business model and about their perspectives on working conditions, pay and OSH issues for the couriers. The use of semi-structured interview guides also made it possible to explore specific themes of particular importance to the interviewees.

Seventeen of the 22 interviews were with couriers (eight in Denmark and nine in Norway), some of whom had experience with one platform company, others with several companies. In some of the interviews we therefore learned about more than one platform company. In Denmark, all the couriers interviewed were male. In Norway both female and male couriers were interviewed, although most were men, which also resembles the general picture of workers in app-based food delivery. We interviewed couriers of different ages, ranging from 20 to 50 years old, and with different national backgrounds. In both countries, a little less than half of the interviewees had native backgrounds, and the other half came from Southern Europe, Eastern Europe, Asia or Africa, and our sample seems to be relatively representative of the demographic composition of the general courier workforce in the two markets. To ensure the anonymity of the couriers, we have, in the analysis, chosen a strategy where we refer to what has been said in the interviews rather than using quotes; when we use quotes, we do not indicate which interview they are from.

In addition to the interviews, we also collected and read documents and data from the companies and the couriers to support our analysis. To gain a detailed understanding of the algorithmic management systems of the companies, we explored Wolt's registration and training programme. Furthermore, informants in both countries provided valuable visual materials, including app screenshots. We also examined company documents such as the Wolt courier protection policy, Wolt's transparency reports and one of the courier contracts, as well as the collective agreements for Foodora and Just Eat (see [Table 5.1](#)).

Table 5.1 Data sources

Source	Type of data	Relevance
Interviews with representatives from platform companies	Denmark (two), Norway (two)	Data about the business model of the platform company, working conditions and OSH
Interviews with union representatives	Denmark (one), Norway (one)	Working conditions and pay, health and safety issues, collective agreements etc.
Interviews with couriers	Denmark (eight), Norway (nine)	Data about the business model of the platform company, working conditions and OSH
Dialogue with labour inspection authorities	Denmark (one), Norway (one)	Health and safety issues, work accidents within platform work
Collective agreements	Collective agreements between the Danish employer organization Dansk Erhverv and the Danish Union 3F, 2021–2023 and 2023–2025; Collective agreements between Foodora and Fellesforbundet, 2019, 2020, 2022 in Norway.	Insight into working conditions and pay
Official documents	Consultation responses by companies to NOU 2021:9 (Proposition to the Parliament, Recommendation from the Work and Social Committee in Norway).	Information on OSH
Documents from the Labour Inspection Authorities	Work Environment Inspection in Foodora Norway, 2016, 2021; Information from the Norwegian Labour Inspectorate about accidents; information from the Danish Labour Inspectorate about dialogue-based inspections with food couriers they met on the streets	Insight into safety and health issues
Documents from the couriers	E-mail exchanges with couriers after interviews. Some sent pictures of the app, contracts or other relevant information.	Data about how the app is used; algorithmic management
Documents from/about the companies	Company websites; Wolt's registration and training programme	Insight into the companies' business models
	Wolt Algorithmic Transparency Report 2022, 2023	Insight into business model

This empirical material was subsequently carefully read through several times and coded according to the work characteristics identified in Ropponen et al. (2019). During this process new categories also emerged (for instance waiting time), and some of Ropponen et al.'s categories were nuanced (for instance, we learned that job insecurity is connected to income insecurity).

5.4 Cases: Foodora, Wolt and Just Eat

In the data analysis process, we observed that working conditions and safety and health concerns were largely consistent between the two countries, although they varied by company (Wolt, Foodora, Just Eat) based on form of employment (see [Table 5.2](#)) and algorithmic management practices. Consequently, we chose not to conduct a comparative analysis between the countries but rather to treat each company as a distinct case.

Our three cases are Wolt, Foodora and Just Eat. Wolt operates in both Norway and Denmark, and we have empirical data from both countries. Foodora also operates in both countries, but most of our empirical data is from Norway because at the time of the data collection Foodora had just entered the Danish market and was in the beginning of organizing their operations. However, we have included information from Foodora Denmark's website about its business concept and we have some information from couriers who have experiences with Foodora.^[20] Just Eat operates only in Denmark. While Foodora and Wolt have expanded their services to include both restaurant and grocery deliveries from their own storage facilities during the pandemic, Just Eat only offers restaurant deliveries.

In this section, we provide a brief overview of each case, the form of employment used, working conditions and the algorithmic management of the couriers.

20. In May 2024, after operating in Denmark in 18 months, Foodora announced that they are closing their operations in Denmark due to "challenging macroeconomic developments" (Eriksen 2024).

Table 5.2 App-based food delivery platforms selected as analytical cases

Company	Foodora	Just Eat	Wolt
Employment status	Independent contractors/freelancers (DK and NO) and employees working under a collective agreement (NO)	Employees working under a collective agreement (DK)	Independent contractors/freelancers (DK and NO)
Weekly working hours	Normally part-time For employees in NO ten hours per week is guaranteed	Ranges from eight to 37 hours Eight hours is guaranteed per week in the collective agreement	No limits
Sign up for shifts	Yes, typically 2.5 to eight hours	Yes, four hours	No
Pay	Employees: paid per hour + additional commission per delivery Freelancers: paid per delivery	Paid per hour (higher hourly pay for extra shifts and supplement for working evenings, night and holidays)	Paid per delivery
Can decline orders	No (employees) Yes (freelancers), but affects future income	No	Yes

5.4.1 Foodora

Foodora, a subsidiary of Germany-based Delivery Hero, entered the Norwegian market in 2015 and expanded to Denmark in October 2022 (by acquiring the existing Danish company Hungry.dk, which had operated in Denmark since 2013). In Norway, the company initially employed part-time couriers and signed a collective agreement with Fellesforbundet in 2019 after a significant mobilization amongst the couriers. The agreement was renegotiated in 2020 and 2022. Since 2019, Foodora Norway has also relied on independent contractors and freelancers – all car-based couriers are freelancers/self-employed. The freelancers are facilitated through third-party umbrella companies known as EasyFreelance and Manymore (Jesnes and Oppegaard, 2023). Foodora Denmark uses freelancers.

Foodora couriers are required to sign up for shifts that typically last between two and a half and eight hours in Norway and two and five hours in Denmark. They must be physically present at a specific location five minutes before their shift starts. Employed couriers are assigned orders while freelance couriers generally have to actively accept delivery requests. Orders are offered or assigned to couriers based on location and order size. Couriers, who can decline orders, must accept them within 60 seconds. If not, the order will be offered to another courier. During deliveries, a dispatch centre follows the courier's route from the restaurant to the customer on a digital map. If couriers need help during deliveries, they can contact the dispatch centre through the app.

The employed couriers in Norway are paid per hour and earn an additional commission per delivery, figures which are set in the collective agreement, while freelancers/self-employed are paid only per delivery – a price they cannot negotiate. According to the Foodora Denmark website, prices for each delivery are calculated based on factors such as distance, number of orders and time of the day and week.

During the pandemic, Foodora Norway also introduced a productivity measure system, which is an example of how the company uses algorithmic systems to manage its couriers. The system was introduced for all couriers, employees and freelancers/self-employed (Jesnes, 2024). Through this system, which also exists at Foodora Denmark, Foodora assesses various aspects of couriers' performance, including adherence to scheduled shifts, app logins, order acceptance rates, active app usage during shifts, acceptance of orders during high-demand hours and more. Based on their scores, the couriers are compared with each other and ranked into batches (one to ten), with priority shift selection given to those in batch number one. Couriers in lower batches must choose less attractive shifts with lower demand and therefore earn a lower income in the following weeks. Couriers receive requests for deliveries, which they can decline, but declining orders may result in being assigned to a lower batch.

5.4.2 Just Eat

The second case, Just Eat, was founded by Danish entrepreneurs in 2000. The company remained Danish-owned until 2020, when it merged with the Dutch company TakeAway.com. Just Eat entered the Norwegian market in 2021 but exited in 2022 after failing to gain a significant market share. The couriers working for Just Eat used to be employed on zero-hour contracts and had no guarantee of either a minimum or maximum number of weekly hours. In 2018, Just Eat became part of the employer organization Dansk Erhverv and entered a collective agreement for its office clerks with the union HK. In 2019, Just Eat was approached by the union 3F which wanted to negotiate a collective agreement for couriers. With Dansk Erhverv's help, the first collective agreement for food delivery couriers in Denmark was signed in 2021 (*Madudbringningsoverenskomsten, 2021–2023*). It was

renegotiated in 2023 and will run until 2025. All 850 Just Eat couriers are therefore now employed under this collective agreement (Ilsøe and Madsen 2022: 70).

The collective agreement allows for part-time and full-time employment, but the former is most common. Couriers sign up for specific shifts with a minimum duration of four hours and they get paid per hour. When they start their shift, they need to log on to the app, but this is only possible when they are close to the city centre. They get a wage supplement when they work during unsocial hours. Just Eat uses different bonus systems and competitions to incentivize couriers to work faster. According to the collective agreement, they must receive their shifts four weeks ahead. It is possible to get extra shifts of at least two hours, but these are voluntary (Madudbringningsoverenskomsten, 2023–2025). The couriers are assigned orders and do not have the opportunity to decline them.

Couriers type in their availability for shifts, and the shifts are assigned automatically. If they are sick, they can switch shifts through different channels. The couriers know little about how orders are assigned but suspect that proximity to pick-up location and type of vehicle used play a role. Upon assignment, couriers receive a pick-up location and time. After pick-up, they register in the app and receive detailed information about the delivery. The app uses GPS for route calculation monitored by the live-support team.

5.4.3 Wolt

Wolt is a Finnish company present in both Norway (from 2017) and Denmark (from 2018). In 2022, Wolt was acquired by the American company DoorDash. In contrast to Foodora and Just Eat, Wolt relies exclusively on independent contractors and freelancers in both Norway and Denmark. In Wolt's terminology, couriers are called "partners". They choose when and where they log on and off the app and are paid only per delivery. When receiving a delivery request, Wolt couriers have a certain amount of time to accept or reject the order. Our interviewees reported having 60 seconds, although according to the Wolt transparency report from 2023, 30 seconds is set as the default; however, it is possible for the couriers to change this (Wolt 2023: 17). The requests contain detailed information about pickup location, delivery destination, delivery distance and the proposed fee. It is possible to "bundle" orders, which means that the courier can pick up and deliver more than one order at a time and thus earn more. While delivering, the courier is monitored by a dispatch centre that can follow their route. The dispatch centre can also be contacted if the courier needs assistance during deliveries.

Since 2022 Wolt has published so-called algorithmic transparency reports describing how their algorithmic management system works (Wolt, 2022, 2023). The company uses, among other things, an algorithm to connect couriers with customers to "offer the most suitable courier partner a delivery task between the merchant and the customer" (Wolt, 2023: 16). In this calculation, Wolt uses information on the location of couriers, their availability (online or not) and type of

vehicle to estimate how large an order can be placed and how fast it can be delivered (Wolt, 2023: 16).

Wolt also uses algorithms to calculate the price for each delivery. In the transparency report, Wolt explains that they "offer a delivery fee for each delivery task that is worthwhile accepting by pricing them based on the individual factors that could potentially impact the delivery" (Wolt, 2023: 19). In this calculation, Wolt uses estimated route distance (not a straight line), the courier's distance to the pick-up location, customer and merchant location, weather conditions, type of order and other factors, for instance difficult of terrain (Wolt, 2023: 19). The fee that the courier gets includes a pick-up fee and a fee for the distance travelled from the pick-up location to the customer or customers (Wolt, 2023: 19). Wolt argues that no delivery is the same and therefore the fee will vary.

To sum up, we have selected three platform companies with different employment arrangements: Wolt, with the freelancer model; Just Eat, with the employee model where employees work under a collective agreement; and Foodora, with a combination of both forms of employment (in Norway). In our analysis, we will also highlight findings concerning working environment challenges that are related to different employment arrangements.

5.5 Analysis

Our analysis concerns work environment challenges for couriers in app-based food delivery, with a special focus on how algorithmic management techniques affect couriers' health and safety. As mentioned in the theory section, our empirical analysis is structured around the findings of Ropponen et al. (2019), who have already identified several health and safety challenges in digitalized work arrangements. However, we nuance and expand their framework based on findings from our empirical analysis. The following characteristics structure our empirical analysis:

- job and income insecurity,
- time (waiting time and time pressure),
- the physical work environment,
- harassment and unfair treatment,
- isolation and competition.

5.5.1 Job and income insecurity

Ropponen et al. (2019) identified job insecurity as an important aspect of job demand affecting the health and safety of platform workers. It is relatively easy to become a courier download the courier app, provide identification, undergo an online training programme but it is demanding to earn and maintain an income, which is why this type of work is considered insecure. Ropponen et al. (2019) only

consider job insecurity, but we argue that income insecurity is also an issue, and that job insecurity and income insecurity are two sides of the same coin.

In our interviews, both job and income insecurity were central themes in the experiences of couriers. However, the extent of insecurity varied between the couriers and the platform companies due to distinct work arrangements (see [Table 5.2](#) and case description above). Hence, while all platform workers experience job and income insecurity, it is more severe for some than for others, which we elaborate on below.

First, the employed couriers at Foodora in Norway and Just Eat in Denmark, who work under a collective agreement and get an hourly wage, have greater job security than freelance and self-employed couriers at Wolt and Foodora, who are compensated solely per delivery. However, the employed couriers often work part-time which can cause income insecurity if they are not able to secure enough weekly hours, and we did learn from the interviews that part-time employment is more common among these couriers as there are not enough available shifts to make a living as a full-time courier. Some couriers work other jobs in addition to their job as a food delivery courier. We have also come across couriers who work for several platforms at the same time to maximize their income.

Employed Foodora couriers in Norway, have a minimum guarantee of ten hours per week in their contracts, with the option of taking on more shifts when available. Part-time couriers fall under the protection of the Working Environment Act (Arbeidsmiljøloven), which includes a provision that allows workers to demand that the hours stated in their contract align with their actual working hours over a longer period of time. Many couriers have used this provision to obtain more than ten hours in their contracts and hence more job and income security (Jesnes et al., 2021).

In contrast, freelancers/independent contractors working for Foodora experience reduced job security since they do not have an employment relationship and they are also not protected by the Working Environment Act. However, in comparison to Wolt couriers, Foodora freelancers/independent contractors are still offered shifts, which gives a certain job security. These shifts are scheduled during peak demand hours, ensuring a guaranteed workload when couriers have a shift. During periods of reduced demand, such as the summer season, the number of available shifts may decrease, impacting the couriers' ability to choose shifts, and hence decreasing job security. This model still provides a degree of predictability that is not present at Wolt (Jesnes and Oppegard, 2023).

There is no job security at Wolt as couriers are only compensated on a per-delivery basis. A Danish Wolt courier explained what it was like to be a courier at Wolt as follows: "We decide ourselves how much we work. It's just an app on the phone and if you turn it on, you're at work, and if you turn it off, you're not at work anymore". A self-employed courier based in Norway explained job and income insecurity as

follows: "Well, there is no holiday pay, for example. So, what you are earning is what you are getting and there is no extra. And if anything happens to you it is your own responsibility. That's the risk you have in this".

When we asked Wolt couriers about their perception of income insecurity, we heard two different perspectives. Some described working long hours with little income. Others also described working long hours and completing many deliveries – often between 50 and 60 – per day but expressed satisfaction with their earnings and did not experience income insecurity. Hence, not all freelancers/independent contractors are concerned with insecurity related to income. Nonetheless, and as we will explore in detail in the next section, we learned in the interviews that earning this much often requires working at a very fast pace, which can increase the risk of accidents and affect health and safety in a negative way.

5.5.2 Waiting time and time pressure

Ropponen et al. (2019) identified time pressure as an important characteristic of platform work. For couriers, time pressure is connected to making deliveries fast. Through the interviews, we also identified time pressure as a characteristic of platform work, but we also found *waiting time* to be both a job demand and a resource for couriers. We start with waiting time and then turn to time pressure.

Most of the couriers we interviewed described waiting for orders. Waiting time can occur if the demand for takeaway is low or if too many couriers are online at the same time, which makes competition between couriers fierce. Waiting time can also occur if the restaurant is slow in making the food or if the customer is not present at the delivery location. The interviews revealed different perspectives on waiting time. Some of the couriers found waiting time challenging, stressful and demotivating, while others did not.

First, we did not find any employed couriers paid per hour that considered waiting time a job pressure since they get paid while waiting anyway. When asked about how they experience waiting time, some of the couriers said that they find it relaxing, including a Just Eat courier in Denmark, who described it in the following way: "Relaxing. If we don't have orders, we can come and sit in here [the interview took place at a Burger King]. This table is actually for us". One could argue that this waiting time could decrease motivation since the job is perceived as boring, but none of the interviewees at Just Eat mentioned being bored or losing motivation when they spend time waiting for orders. They all accepted that waiting time is a part of the job.

On the other hand, several other couriers from both countries who worked as freelancers experienced the waiting time as more stressful and they linked it to income insecurity: they were frustrated that they had to wait because then they did not earn money. It is not entirely clear in our data, but it seems that there is a connection between whether or not a person experiences waiting time as

exhausting and employment arrangement, with our data showing that more freelancers than employees experience waiting time as a job demand even though this was not the case for all the freelancers we interviewed. This point about the relation between the experience of waiting time and work arrangement is elaborated in this citation from a Danish courier at Just Eat in which he imagines what it is like to work at Wolt. He also reflects on time pressure:

If it's the same way [at Wolt] that there are days when you have nothing to do, then you don't get any money from working for Wolt. I don't think I would be able to. I'd rather have a flat salary and not have to stress. It's not a job worth stressing yourself over ...that is the thing about thinking that if I am really fast, I can run the next order. I would sit all the time thinking about being able to reach this and that. And as soon as you stand inside a restaurant and the food is not finished, you stand there and lose your earnings. And then you get angry. We can also see that from the other couriers. They are significantly more impatient in restaurants. I just sit down and wait. It doesn't matter to me. I get the salary I get.

A freelance courier based in Norway working for both Wolt and Foodora had a similar interpretation. He also reflected on the relation between waiting time and motivation: "I prefer shifts [with Foodora], because when you have shifts [...] your motivation is like 'Ok, I work from three to seven.' But with Wolt, if I don't get the order fast enough, my motivation goes down and I don't want to work".

However, we did also interview freelance couriers who were not worried about waiting time or who had strategies to cope with or avoid it. For instance, one Wolt courier in Denmark had made the decision only to work during peak times when the waiting time is shorter so that he simply avoided long waiting times. Another courier from Denmark used longer waiting times to make other shorter deliveries. This last courier is an example of something we also encountered in our interviews, namely that some freelance couriers seemed to be very keen on time optimization, to the point that they were constantly thinking about how to minimize waiting time and make deliveries very fast. They tended to perceive delivering fast as an individual skill that makes the job more motivating, like this Danish Wolt courier who did not experience time pressure as a job demand: "I like cycling a lot and I do it very fast". And he continued by explaining why he likes working as a courier:

It's about understanding how to find your way around the city without GPS. I know where most of the customers are. I can open and close a bag quickly. I know where to position myself at traffic lights so that I can go before everyone else. These are some small things you pick up.

Other freelance couriers did experience time pressure, which they sometimes linked to the fact that the platform company bundles orders that are too far away from each other. Here is one example, shared by a Wolt courier:

Sometimes the system [the app] is so bad. For example, it was so stressful yesterday, because they gave me three orders – two orders in X and one order far away in Y ...and I lost half an hour writing to support to ask them to drop the one in Y and give me the one in X. The customer ended up waiting ten minutes more because I lost time writing to support.

In sum, waiting time and time pressure during deliveries seem to be central characteristics of food delivery work, but couriers understand and cope with it differently. However, it would appear that the type of work arrangement (employed paid per hour or freelancer paid per delivery) has an impact on how severe or challenging waiting time and time pressure is perceived, with couriers who are employed and assigned orders (the case of Just Eat in Denmark) perceiving both waiting time and time pressure during deliveries as less problematic because their earnings do not depend on the number of deliveries they make.

5.5.3 Physical work environment

Ropponen et al. (2019) found that the physical work environment is a job demand in delivery work because couriers are specifically prone to riding fast on bikes, the risk of accidents and tough working conditions due to weather. These themes are also prevalent in our interviews.

Accidents in the food delivery industry in Norway and Denmark are common, according to the couriers we interviewed. In both countries, nearly all interviewed couriers had experienced accidents, ranging from minor to major incidents, either on bikes or on scooters. Several interviewees told us about more severe accidents, resulting in longer periods of income loss, and some were now afraid of working in bad weather due to the risk of accidents.

The high risk of accidents could partly be attributed to the payment structure for couriers, where freelancers and self-employed individuals earn based on each delivery, incentivizing faster biking or driving to increase income. While employees follow a similar model, with an hourly wage, in some cases supplemented by delivery commissions, the pressure is less pronounced, as we demonstrated above.

Several couriers also described harsh working conditions. In the following quotation, a courier who was working as both a freelancer at Wolt and an employed courier at Foodora told us about how he experienced the physical work environment:

It is tiring, yeah. It is not mentally tiring, but it is physically tiring. In winter, if you are not moving, then you get cold, really cold. If you are not wearing gloves, if it's just for a few minutes, then you your hands also freeze. So you have to keep warm inside the buildings, waiting until you get your next order. Because if not, if you are still outside, then you get really cold.

Similarly, a Danish employed courier working for Just Eat told us about working in the cold Danish winter. He was provided with gloves, but the temperature got so low that the gloves were not warm enough:

They [the gloves] cover everything reasonably well, but when temperatures get extremely low, there is really nothing that can keep the cold out. The problem is that it is progressive the longer you are out... It's just cold. I lost a lot of weight during that period. Two to three kilos in ten days.

Furthermore, he expressed doubt about whether he would work as a courier next winter because the cold weather is too much for him to handle. These accounts highlight the profound impact accidents and harsh weather conditions can have on couriers' well-being and income security.

The previous citation also touches upon another relevant theme, namely proper equipment and safety equipment such as clothes, helmets etc. Here we find differences between the platform companies. Just Eat provides employed couriers with the necessary equipment for free while the other companies rent out equipment (Foodora) or have the couriers buy it (Wolt). However, as we saw in the quote above, this equipment is not always sufficient: the gloves provided for the courier were not warm enough to keep the cold out.

In terms of safety equipment, employers can instruct their employees to wear helmets, for example, but this is not the case for the food delivery companies that use the freelance model. Considering the high risk of accidents in the industry, this is unfortunate. In a consultation response to a government-appointed committee on the Norwegian model and the future of work (NOU 2021:9), Foodora stated that they regretted their inability to enforce helmet-wearing among freelancers/independent contractors:

Because this [setting a requirement for wearing a helmet] could be considered an exercise of management rights on our part, we have had to remove it from our agreements. We would like to emphasize that this is a very unfortunate result of the current legal situation and that we want to take the same safety considerations towards all our couriers, something that will be able to be taken care of largely through an extended obligation for the company to ensure a fully responsible

working environment including for self-employed contractors. (Foodora, consultation response, June 2021, our translation)

5.5.4 Harassment and unfair treatment

Ropponen et al. (2019) also highlight harassment as a characteristic of platform work that can affect workers' safety and health. In our data, we found examples of couriers who had been subjected to harassment. Our data do not show harassment to be a daily occurrence, but we get the impression from the interviews that most couriers do experience it from time to time. For instance, one courier based in Denmark described how he had been pushed off his bike more than once by random people on the street, and a courier based in Norway explained that he had witnessed harassment at work:

Yes. I was working for Foodora and I was in the restaurant and there was a guy from Wolt, but the time was overdue, the food should have been ready. And the cook was telling him: 'Wait two minutes more, two minutes more.' After a while, the Wolt rider got mad at him and started screaming, so the cook took a knife and threatened him.

However, we also have several examples where food couriers described how they believe that they are being exposed to unfair treatment, often by the platform companies. This unfair treatment is often connected to intraplatform algorithmic change, which is where the platform companies change the way the algorithmic management system works or change other aspects of how they organize work in ways that are unfavourable to working conditions and couriers' OSH. For instance, in Denmark in 2021 Wolt removed a weekend bonus for couriers having completed a certain number of deliveries and lowered the fee per delivery. Couriers argued that these cutbacks made their working situation even more insecure, and the grassroots organization Wolt Worker Group organized a demonstration against Wolt in Copenhagen (Hau and Savage, 2023). Couriers again mobilized in the spring of 2023 when Wolt launched a new payment model based on what they called more "dynamic price setting". According to the couriers, the new model made the price setting opaque and was, in practice, a camouflaged payment reduction.

Another example is from Foodora couriers in Norway, where the productivity assessment system has led to feelings of unfair treatment among Foodora couriers because they receive messages about their performance in the app and via e-mail. One informant, who worked as a freelance courier for both Wolt and Foodora, provided evidence of these messages through screenshots and communications from the company. Even when couriers have a high order acceptance rate, declining a single order triggers messages from the company stating that couriers are declining half their orders and warning that this will reduce their overall earnings, scores and performance numbers and if more orders are declined, then it will result in a temporary suspension from the app. In this sense, there is a perceived

unfairness in the productivity measurement system, which penalizes couriers for declining orders, affecting their overall performance rating and income. This is also the case if couriers choose to take a break: "You do get a break, but it also gives you a lower performance rating because it counts as time you are not working", said one Foodora courier. An employed courier based in Norway explained how he and other couriers perceived the app as harassing them: "I experience the app as harassing when I am put on pause because I am not quick enough to respond due to the weather conditions in Norway making it difficult to respond quickly in the app. I perceive this as a punishment because I am not fast enough". "Put on pause" in this context means that the courier is temporarily suspended from the app.

Additionally, informants also discussed their attempts to address similar instances of mistreatment, emphasizing the stressful and time-consuming nature, and often fruitlessness, of filing complaints. These complaints rarely resulted in any meaningful changes to their performance levels within the app, leading one courier based in Norway to remark: "It is not worth complaining". Thus, couriers find it difficult to take actions that lead to change in the platform companies' business models.

5.5.5 Isolation and competition

Finally, Ropponen et al. (2019) identify isolation and competition as two central work characteristics for platform workers that represent a significant job demand. They describe how digitalized platform work is often performed alone or separately from other platform workers with no face-to-face interaction with colleagues or supervisors, and in some cases also in competition with other platform workers. Ropponen et al. (2019) argue that this enhances the social isolation of this work situation, making communication with other platform workers, clients/customers and the platform company challenging, and couriers can feel anonymous and as though they do not have their own voice.

Since app-based food delivery is carried out in the physical world, the theme of isolation is not so pronounced in our empirical data. Even though work is carried out alone, couriers did not report feeling isolated or lonely. Most of them described a friendly atmosphere among the couriers, including talking while waiting for orders, and some of them know each other so well that they help each other out if needed. For instance, if someone is in an accident, others will help the courier and also deliver the order. In the case of the employed couriers at Just Eat in Denmark, they seem to have a more collegial relationship where they can engage in conversations with other employees while waiting for orders (as in the earlier quotation where they have a table at a Burger King where they can wait for orders). This gives them an opportunity to discuss work concerns in a social and physical environment.

In terms of communication with the platform companies, the couriers in all three companies can contact a dispatch centre if they have problems during their deliveries. Normally this is done through a chat function in the app. Issues range

from having to stop the shift/delivery due to mechanical problems with bikes to having trouble locating a customer, experiencing a long wait at a restaurant/pick-up place or finding that the food does not meet proper standards or that something was damaged during the delivery. The call centre is in a way the only human intervention in the labour process the couriers' experience. On the one hand, the couriers know that it is important to be in contact with the support team in case something happens as this courier from Denmark explained: "It's important to be in contact with the chat, because if you don't, you lose time". He therefore understands that he depends on communication with the support team. Another courier shared that the support team gives him a sense of security during deliveries. He feels safe because he knows that the people providing live support at the headquarters are monitoring him and that he can easily get in contact with them. On the other hand, couriers also reported instances of poor and frustrating communication with the support team and these seemed to be related to the fact that they most often communicate with the dispatch centre when something has gone wrong and they feel that the communication is about these problems, even though they are not always to blame. This is probably also connected to the physical distance between the couriers and the headquarters; the couriers found that the people working in support did not understand their perspective on how something happened when they were not physically present. The couriers did not mention feeling anonymous or alone like Ropponen et al. (2019) report, but we got the impression that they feel distanced from the people working in the support team.

Ropponen and colleagues also highlight competition as a characteristic of digitalized platform work, arguing that it can enhance feelings of isolation if workers are competing with others for employment and they don't know who these others are. In our data, competition between food delivery couriers was not a theme as such, but in the case of Foodora Norway, which has a business model with both employees and freelancers, competition between couriers with different employment arrangements was an issue and was perceived by some couriers as discrimination or unfair treatment. One freelancer explained the competition as follows: "The employed couriers are not happy because they know how much we make, and they know that we try to get shorter distances to make more deliveries. Every time the freelancers get the short distance, employees get the longer distances". One of the employees explained that removing the freelancers would be the best way to improve the working environment and OSH:

Get rid of the freelancers. It ruins the work environment and the working conditions. [...] The conditions for employees are too poor, and people are forced into freelance contracts. It's a safety risk and it creates competition for assignments, which can also increase the risk of accidents.

5.6 Conclusion

In this chapter, we have explored working environment challenges for couriers working in different forms of employment in app-based food delivery (Wolt, Foodora and Just Eat) in Denmark and Norway. We have had a special focus on investigating the connection between algorithmic management and the couriers' occupational health and safety.

In structuring our empirical data around working environment challenges, we took inspiration from the analytical framework from Ropponen et al. (2019), who identify a number of job characteristics of digitalized platform work that threaten occupational health and safety. However, we have also added job characteristics from our empirical analysis, including job and income security, waiting time and time pressure, the physical work environment, harassment and unfair treatment and isolation and competition.

First, we found that job and income insecurity emerged as significant topics among couriers. All the interviewees, regardless of type of employment face job and income instability in a more formal sense, but its severity varies depending on what company they work for and their form of employment, with employed couriers having more security than freelance/independent workers. However, not all freelancers experienced insecurity. Those freelancers who managed to earn enough money did not seem to be concerned about the insecure nature of the job.

Second, we found that waiting time and time pressure were defining features of food delivery, but the interviewees coped with them differently. However, freelancers seem to be most exposed to time pressure, which is linked to their employment arrangement and payment structure, according to which they earn more the more deliveries they make. We also found that couriers have a physically demanding job, working outside in all types of weather and with equipment that is not always sufficient. Again, the physical demands of the job are connected to the type of employment the courier has and the payment structure that the companies use: some couriers have more incentives to bike or drive faster to increase their income.

Third, we found evidence of couriers experiencing harassment, and we also encountered cases where couriers felt they were being treated unfairly, especially by the platform companies. This perception of unfair treatment seems to be linked to algorithmic management and intra-algorithmic change, which makes it difficult for couriers to understand the rationale behind a function of the app or the payment structure.

Finally, while Ropponen et al. (2019) highlight isolation and competition as key job characteristics for platform workers, isolation does not seem to be a prominent job characteristic for food delivery couriers. Competition appears to be most prominent in the case of Norwegian Foodora, which uses different employment models that create dissimilar working conditions for couriers working for the same platform company.

All in all, our empirical analysis reveals that couriers working in app-based food delivery in Denmark and Norway are exposed to health and safety challenges. App-based food delivery work is insecure and physically demanding and can be mentally stressful, but we do find differences between couriers in how they cope with these challenges. Furthermore, algorithmic management and intraplatform algorithmic change (for instance the productivity measurement system at Foodora and changes in the payment structure at Wolt) seem to encourage a more insecure working environment; couriers also find the system unfair and untransparent, but they have limited opportunities to get the system changed. Moreover, the work arrangement in place seems to impact the severity of the challenges: couriers employed under a collective agreement are less exposed to these challenges compared to freelancers, which can be explained by the fact that employers have a greater focus on the working conditions and health and safety challenges of their employees compared to the freelance model.

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Chapter 6

Transparency and platform workers' autonomy

Laura Seppänen (Finnish Institute of Occupational Health)

6.1 Introduction

Research findings suggest that worker autonomy is an important factor in determining the positive or negative effects of digitalization and new technologies on employee health (Christensen et al., 2019). Employee health may also be enhanced by organizational autonomy support (Liu et al., 2020). If working conditions allow autonomy, it implies that workers have more capacity to act – that is, more latitude or room for manoeuvre – in their work. Here, this capacity to act is called *agency*, which means “a temporally constructed engagement by actors of different structural environments” (Emirbayer and Mische, 1998: 970). Agency, which is closely related to self-management and self-regulation, means not only making informed choices or managing uncertain working conditions but also raising one’s voice and influencing these conditions, at least a little (Gegenhuber et al., 2021; Heikkilä and Seppänen, 2014; Seppänen et al., 2023). Sometimes the word autonomy may include agency as a degree of power or discretion to decide and influence one’s work context (e.g., Laursen et al., 2021). In this chapter, autonomy and agency are separated for analytical purposes. Structural work environments differ in how much they enable autonomy, and thus agency, to actors such as platform workers.

Despite apparent risks, platform work is often considered to provide workers more autonomy than traditional employment relationships. This is because on digital platforms, compared to in a standard employment relationship, workers are often given more freedom to choose when, how or how much they work, allowing them to combine work with care responsibilities or studies, for example (Huws et al., 2018; Ropponen et al., 2019). Autonomy, flexibility and freedom often motivate workers to platform work (Pesole, 2018; Schor, 2020; Wood et al., 2019).

One important aspect that conditions worker autonomy is transparency. Transparency means that third parties can see a chain of activity or decision-making (Stohl et al., 2016). In principle, digital technologies have the capacity to radically increase the possibility of transparency. In this chapter, transparency, or its opposite, namely opaqueness, means that a worker, in practice, can visually see (or not see) information or clarifications about operations or the environment from the

labour platform. The transparency or opaqueness of a labour platform affects workers by enabling or limiting their agency their capacity to make informed choices and to have alternatives for action in the platform environment. It is useful for labour inspectors to understand how labour platforms operate, and transparency offers a window into the effects of digital platforms on workers' working conditions and work environment.

The aim of this chapter is to better understand digital and platform organization as a basis for occupational safety and health (OSH) risks for platform workers. Digital labour platforms are predominantly characterized by their information and communication technologies and algorithmic management (Wood, 2021). The chapter explores how transparency, or lack thereof, is experienced by platform workers in their practical work and with what consequences. How does the transparency or opaqueness of the platform operations affect platform workers' autonomy and agency? How do labour platforms manage transparency, and what are the outcomes for workers in terms of autonomy and agency?

The data consist of nine qualitative thematic interviews with food delivery couriers living and working in Finland. This food delivery service is a form of on-location platform work, carried out through an international company referred to as the *delivery platform*, where couriers transport food from restaurants to clients using cars, bikes, or scooters. Four of the nine courier interviews were conducted in 2017 and five in 2022.^[21] The interview guide focused on platform workers' experiences with their work, how the platform shapes their activities and the role of platform work in their career and life.^[22]

The next section details the concepts of autonomy and transparency. Subsequently, [Section 6.3](#) explores the couriers' work on the delivery platform. [Section 6.4](#) describes the findings on how transparency or lack thereof affect couriers' autonomy and agency. Finally, [Section 6.5](#) discusses the importance and role of transparency and autonomy in assessing OSH risks in platform work, and the implications for Nordic labour inspectorates.

6.2 Autonomy and transparency

6.2.1 Autonomy

Autonomy in the workplace is generally understood as the ability to exercise a degree of control over the content, timing, location, and performance of work activities (Mazmanian et al., 2013). According to Karasek and Theorell (1990), autonomy is a core psychosocial factor at work that plays an important role in

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21. Interviewees were recruited with the help of Delivery platform giving a list of couriers' codes to the researcher. The researcher then selected randomly the codes to whom Delivery platform sent an invitation email that was written by the researcher. Interested couriers then contacted the researcher. In this way, couriers' anonymity towards Delivery platform was preserved.
 22. ATLAS.ti software was used in coding, and the data were analysed from the perspective of platform's and platform environment's transparency and consequences.

occupational health and well-being. High demands at work are particularly stressful when the worker has little control (low autonomy) over their work (Karasek, 1979). High autonomy and high social support both buffer the detrimental effects of high workload (Johnson and Hall, 1988). Peer and social support are often low in platform work, and the control exercised by the platform algorithms is high, implying that platform workers are especially at risk of experiencing occupational stress resulting from high workload (Berástegui, 2020: 37–38). Autonomy is a resource that increases motivation and engagement at work, which in turn affect safety, including injuries and accidents at work, sicknesses, and mental health (Ropponen et al., 2019: 59).

The question of worker autonomy in relation to technology use or digitally organized work is complex. Ten years ago, Mazmanian and colleagues (2013) found that the use of mobile email technologies increased knowledge professionals' autonomy in terms of being able to work anywhere and anytime. But in the long run, they argued, this "anywhere and anytime" phenomenon intensified collective expectations of their availability and escalated their engagement with work, thus reducing their ability to disconnect from work. In other words, technology-induced increased autonomy in fact decreased their autonomy. This is referred to as the *autonomy paradox* (Mazmanian et al., 2013). Workers may voluntarily limit their autonomy and even experience this voluntary limitation as part of their autonomy, the paradox suggests.

Even if labour platforms allow autonomy over which tasks or projects to take on and how and when to fulfil them, platform workers may remain subject to intensive surveillance and control, limiting their autonomy. This has been called the autonomy paradox in platform work (Laursen et al., 2021; Möhlmann and Zalmanson, 2017). Platform workers do have freedom and flexibility, but due to their need to increase their reputation and ranking to compete with other workers and gain income, platform workers may voluntarily engage in a lot of unpaid labour and work unsocial hours, which increase OSH risks (Jarrahi et al., 2020; Laursen et al., 2021; Ropponen et al., 2019; Sevchuk et al., 2019). Platform workers may see their voluntary efforts as part of their autonomy, without seeing the possible negative effects to their health and safety.

But what are the mechanisms that enhance or inhibit workers' sense of autonomy on labour platforms? To gain work and income, platform workers need to know how the platform works in terms of matching tasks and workers, how workers are evaluated and ranked, what is the demand situation for their work, and so on. Workers' knowing requires that platform companies make necessary information transparent to platform users – transparency thus becomes a resource that makes agency possible.

6.2.2 Transparency and opaqueness

As we saw above, the role of labour platforms is to match workers with tasks offered by requesters or clients. In digitally mediated virtual environments, there can be few real social contacts between workers and clients, and sometimes there is even no contact at all. The worker and the client are often strangers to each other, and their relation can be short, as in food delivery. Despite this, they need to trust each other: the client needs to trust that the worker will perform the service, and workers need to trust that they will be paid for their work. Furthermore, platform users need to trust the labour platform, and vice versa. Digital platforms, with their capacity for transparency, were initially created for the purpose of building and maintaining trust between strangers (Sundararajan, 2016).

Transparency is defined in many ways including as the disclosure of information (Mol, 2010), "seeing through" information to detect something of interest (Stohl et al., 2016), or understandability of a specific (algorithmic) model for accountability (Kemper and Klokman, 2018). Transparency implies that somebody can trace the process through which a decision, score, or outcome is made, and it is a valued term (Ball, 2009). Transparency can be enhanced relatively easily by using digital technologies and the Internet.

Transparency is necessary for seeing and knowing. When individuals can see the behaviours of others directly, it is clearer to them what activities are conducted and how. But when behaviours are made visible through technology, seeing and knowing become more difficult. Digital technologies, data, and algorithms – also called "digital architectures" – extract and encode data from work into certain datapoints, aggregate and compile them to more abstract categorizations and compute them into scores and measures. The new scores, measures or visualizations take part in, shape, and influence workers and working in different ways (Leonardi and Treem, 2020; Flyverbom, 2022).

Usually, transparency helps people see and know better. However, transparency does not always imply that things can be seen and known (Ananny and Crawford, 2018; Stohl et al., 2016). Sometimes more transparency can even produce opaqueness, a situation that is called the *transparency paradox* in research literature (Stohl et al., 2016; Leonardi and Treem, 2020). The transparency paradox refers to the fact that sometimes more communication and transparency hide rather than reveal information to people. For instance, increases in transparency can produce such a large volume and diversity of communication that finding and understanding any single piece of information becomes difficult. This is called "unintentional opacity" (Stohl et al., 2016: 133).

Opacity through transparency, as in the transparency paradox, can also be intentional. Actors or organizations can purposefully make so much information visible that receivers will be distracted from some central information. Or

information can be made transparent in a manner that is ambiguous, misleading or difficult to understand in other words, transparency does not produce visibility. When opacity through transparency is intentional, as in these cases, it is called "strategic opacity" (Stohl et al., 2016: 133–134). For organizations, strategic opacity can be a way to simultaneously comply with expectations and hide important information. (Stohl et al, 2016). In Section 6.4, we will investigate some practices of the delivery platform that can be interpreted as strategic opacity.

In this chapter, transparency means that platform workers can see – or not see in the case of opaqueness– information (such as text, picture or video, figures or oral information or clarifications) that helps them use their agency, make informed choices and craft their work according to their motives and interests. While perceived autonomy is important for workers' health and well-being in digital work environments (Christensen et al., 2019), it is argued that transparency is needed for workers' autonomy and agency.

6.3 Delivery platform

The delivery platform offers new couriers "freedom and flexibility" and promises them "you can choose when to offer your services" (Delivery platform's induction material, 2022). Once accepted, couriers first need to book work shifts in the platform application. In principle, they can work as much or as little they want, but in practice, competition between couriers and rules of Finnish residence permits limit this formal flexibility. For instance, students with a temporary residence permit and without an employment contract can work only a limited number of hours per week (Perkiö et al., 2023). When starting a shift, a courier goes to a starting zone and logs in to the app through their mobile phone, with GPS on. After the courier receives an order, they accept it by clicking a button in the mobile application. Couriers have a right to refuse tasks, but refusing more than two tasks means that they cannot get new orders for half an hour. A courier keystrokes into the app both pick up and drop off the food, and in case of trouble, a courier can ask for help from the platform. When the order is completed, the courier is ready to receive the next one.

The delivery platform matches food orders with couriers. Based on performance data collected from couriers, the platform ranks them into five levels at regular time intervals. Performance measures affecting the ranking level are the number of deliveries per hour, no-shows or being late to their shift, number of work hours, and other minor factors (Delivery platform's induction material, 2022). The better a courier's performance ranking, the better their level as a position to reserve working shifts. Therefore, ranking scores heavily affect a courier's agency in terms of access to work and earnings. Next, we turn to the findings of the study.

6.4 Transparency, autonomy and agency in courier work

6.4.1 Transparency enhancing couriers' autonomy and agency

The delivery platform can see couriers' activities and their geographical locations, which enables data collection for performance metrics and scoring. The platform is able to assist couriers in finding the customers' homes, because it records the couriers' positions. The food courier interviews from 2017 and 2022 reveal that the delivery platform has, through technology, considerably increased transparency for couriers.

As we saw above, the platform ranks couriers to certain levels based on their performance scores. Couriers with good performance, and thus ranked highly, can choose the most lucrative shifts. Highly ranked couriers enjoy more autonomy than those with lower rankings (Perkiö et al, 2023). The ranking level is of utmost importance in getting working shifts and income. One courier^[23] said: "So if all your points [of] working performance point to something very good, then you have enough working shifts". The delivery platform informs couriers about the basic logic of the rankings and the performance criteria based on which they are evaluated. Couriers know that speed – how many gigs they complete in an hour – and the number of hours they work are important criteria in their ranking. Couriers feel that they have agency and can influence their ranking through performance. One of them argued: "Well, it seems fair to me, because there is the system of levels, so you can yourself influence what level you are on". This agency and the ability to influence one's ranking is a positive outcome of the platform making transparent the evaluation criteria for couriers.

In autumn 2021, a new feature appeared on couriers' app. They could now see the final address of the client from the first announcement of a gig. Previously, they received this information only after picking the food from a restaurant. A consequence of enabling couriers to see the customers' addresses upon allocating the request to the courier was the strengthening of the couriers' agency through the ability to make more informed decisions about what "gigs" to accept based on a better understanding of how lucrative they will be. One courier said: "You can more easily pick the gigs you want when you know where the client lives (...) You can refuse to take a gig that you know, okay, it will take me somewhere without restaurants and with fewer orders".

Another new transparency feature was offered to old couriers a couple of months before the interviews. When receiving an order and before accepting it, a courier would see how much money they would get from that order. We call this feature an "advance notice of payment". As one of the couriers argued:

23. Interviewed couriers are not differentiated in the text when it is not important from the point of findings. All data quotes are in italics.

It [the advance notice of payment] was thought to be a good thing, that you can accept based on, hey now I get eight euros, I start driving a bit longer distance when I know that I will get eight euros for sure. Before, I would have had to estimate from the map the two points visually, and with my knowledge of the map certainly I could know it before, but I thought that this is good.

By helping couriers estimate income from orders, the advance notice of payment could increase their selection and thus their agency. We will come back to this later.

6.4.2 Opaqueness limiting couriers' autonomy and agency

A second and equally important question is how the platform decreases transparency for couriers – and with what outcomes. This is explored by looking at task allocation, ranking, and preconditions for advance notice of payment.

According to the interviewed couriers, the delivery platform is not transparent about how tasks are allocated to couriers. One of them said:

I don't know [how tasks are allocated] and probably even those app guys don't know, because that app has been developed somewhere abroad and it can be there in the code somewhere. Maybe nobody knows. But I think it would be fair to clarify it (...) because then, as a worker you could [better] plan your location.

According to this courier, seeing and knowing how tasks are allocated would enable couriers to improve their tactics for selecting their locations and tasks. This would be a positive agency outcome of transparency. Many couriers had tried to ask the platforms about the task allocation mechanisms without receiving adequate explanations. Some couriers also would have liked to have more transparency about the location of orders. One possible outcome of increased transparency regarding geographical demand might be that couriers could better anticipate future gigs. One courier had suggestions:

On the map [on the platform app] there could be green dots showing the places where there are lots of unaccepted orders. (...)You could then anticipate where you should be driving if you don't have a task. (...) In principle, the platform advises you to go towards the centre zone, but it is not necessarily worth it because your next order can go in a completely different direction.

As we saw above, the platform enables the couriers to see and understand the performance criteria that are the basis for their ranking and work shift distribution. However, couriers cannot see how many couriers there are at each ranking level. Another courier said:

At least when delivering by bicycle, first of all, you are unable to plan far [ahead], [for example] if you will be able to obtain work shifts or not, especially in summer. Because you don't know, first, what will your level be because [the delivery platform] decides how many workers go into the first and second levels, and it always varies. So you never know [if you] have you been good enough for the first level. And you can guess, okay, if I'm on the second level, probably there will not be enough work shifts for me because couriers on the first level will take them all next [time].

In this excerpt, the courier explains why delivering food by bike as a full-time summer job is uncertain and untenable on the delivery platform. Many bike couriers want to work as much as possible in summer rather than during the cold and snowy Finnish winter. In summer, the competition between couriers becomes "cutthroat hard", as one courier put it. There is uncertainty about the amount of demand at any given time, and the company's tactic is to flexibly regulate the number of couriers at each ranking level to balance the supply and demand of deliveries. This causes uncertainty and stress, particularly among those couriers who are dependent on platform income. This is also the reason why couriers who need the income so eagerly and voluntarily work quickly and long hours, causing fatigue and risks to their health and safety.

The delivery platform tries to balance supply and demand and thus diminish the demand risk to couriers by distributing work shifts based on performance control and ranking levels. The positive side for couriers is that the risk of not having gigs during their work shifts is small. The negative side is that they must compete with each other for work shifts, which requires them to constantly maintain or improve their ranking.

The delivery platform had recently provided more transparency for experienced couriers with the advance notice of payment feature, as we saw above. This was a welcome improvement to couriers' working conditions (see the last quote in [subsection 6.4.1](#) above). However, this option was only available in a new contract between the delivery platform and a courier. Couriers with an old contract would get it only if they would change to the new contract. In the following quote, a courier with the old contract compares the transparency in his app with that of his colleague who has the new contract.

In their app, my friend who is paid less than me, he can see his... he has more features in the app than me. Okay. So now when we talk to each other he says he can see how much he earned from this task. And I cannot see that. I will only see at the end of the month. They will send me the calculations, like you made this many deliveries, you drove this many kilometers, and this is...and then do the calculation. I have to wait until the end of the month, but my friend, he can see his earnings right

away. So, they [the delivery platform] sell those features. So they will send me an email, we have these new features in our app, if you want to have access to them, then choose this [new contract].

This new contract, offered as an option to couriers with the old contract, included a change in the payment system: the fee for each gig was higher than before, but the hourly pay during a shift included in the old contract was removed. The same courier elaborated on the issue:

For example, tomorrow me and my friend are both working, and he has this fear in his head like if he doesn't get a task in an hour, he will make no money. But I am relaxed. If there is no task in an hour, I will get paid eleven euros for that hour. So our state of mind will be different. (...) this is the other thing with that new [contract].

The old contract offered a more stable income through its hourly base pay while the new contract provided increased transparency. Some couriers went after the better transparency while others calculated the outcome of the change in terms of income and decided not to sign the new contract. Incoming couriers were offered only the new contract without the hourly base pay. By advertising the advance notice of payment as an improvement in transparency, the delivery platform may have purposely directed old couriers' attention away from the effects of contract change on their income. This can be interpreted as an example of the strategic transparency paradox (see [subsection 6.2.2](#)) where organizations, by introducing new transparency features, may divert attention from less favourable changes introduced simultaneously.

6.5 Discussion and conclusion

In this chapter we have examined how transparency on the platform affects workers' autonomy, and agency. Besides alleviating OSH risks, autonomy is also important for learning in routine platform work where opportunities for skills and career development are poor (Eurofound, 2018). Platform-enabled transparency helps workers in many ways. The main criteria for performance evaluation and payment are often transparent, and new technologies can allow platforms to add more worker-supporting features to their apps. This kind of transparency gives platform workers autonomy and enables them to make more informed decisions, thus influencing their way of working. Simultaneously, platforms' opaqueness limits platform workers' autonomy. As a result, workers need to tolerate uncertainty and stress. When workers are in competition with each other, lack of transparency promotes haste and working long hours, increasing OSH risks. Workers need self-management (Ropponen et al., 2019) and they must be attentive to changes proposed by platforms.

The findings of this study suggest that transparency, or lack thereof, has consequences for couriers' autonomy and agency. But its role should not be overestimated. For instance, transparency does not in itself affect the crucial question of income. Income level, the piece-rate system, and the evaluation and ranking system all encourage platform workers to increase efficiency, with haste and stress as outcomes. Platform workers benefit from positive demand and suffer from negative demand. Moreover, transparency cannot directly improve working conditions related to the physical environment. Too much emphasis on transparency may fall into the transparency paradox by hiding other important factors affecting OSH. That said, transparency is still very relevant because, as we have seen, it may help workers' own agency in terms of self-management and self-regulation. Transparency may also help platform workers better understand the autonomy paradox and thus avoid the phenomenon Laursen et al. (2021) call the "double autonomy paradox". By revealing some of the logics of labour platforms, transparency may increase workers' agency in reflecting and deciding whether they want to continue with platform work or find alternatives (Alasoini et al., 2023). When it comes to transparency, platforms have a great deal of power in deciding what to reveal or hide. We can imagine the huge possibilities for transparency and opacity labour platforms and other organizations have with their algorithmic and AI management systems.

Labour platforms can and do improve transparency for the benefit of workers. Despite increased transparency, however, platform workers are still confronted with opaqueness and uncertainty (Perkiö et al., 2023; Rahman 2021). This study suggests that labour platforms may tie improved transparency features to other less beneficial changes so that the latter may remain hidden from workers, either unintentionally or strategically. The transparency paradox (Leonardi and Treem, 2020; Stohl et al., 2016) highlights how sharing more information does not necessarily produce transparency. Other factors may affect transparency: accessing the information may require too much effort or platform users may not have the necessary skills to read or interpret information. By increasing transparency for workers, delivery platform companies may try to strengthen workers' independent entrepreneurship. Labour inspectors could instruct platforms to pay attention to transparency and communication to and with platform users (Seppänen et al., 2022).

Labour platforms may need to keep their evaluation systems opaque for reasons of confidentiality or because users might otherwise game the system (Cedefop, 2020: 49). If systems can be easily gamed, there would be little variation in scores and rankings, which makes it difficult for the platform and/or clients to differentiate between workers (Rahman 2021: 949; Tadelis, 2016). Workers can influence their rating through their work, but after that, scores and rankings remain largely outside of their control, being moulded by platforms' complex algorithms in a way that is partly opaque to workers.

In general, platform workers' expectations for autonomy are high and labour platforms attract workers with flexible working times. Still, workers may, either voluntarily or by necessity, choose to work at unsocial hours (evenings, weekends or even at night) and do unpaid work to gain tasks and income (Ropponen et al., 2019). The autonomy paradox refers to this discrepancy between flexibility and real experience of time use, which may be intensified by labour platforms' rating and income systems. The autonomy paradox can cause workers to speed up and to work long days and weeks, thereby increasing health and safety risks. In particular, workers who are dependent on income from platforms are in a vulnerable position (Schor, 2020).^[24] The OSH risks are affected by workers' experiences of autonomy, and the autonomy paradox helps us understand the puzzle from workers' own perspective. This study suggests that the transparency paradox may aggravate the autonomy paradox by limiting platform workers' ability to see and know crucial information that shapes their agency and affects their work, income and well-being.

Transparency provided through algorithmic systems can, in theory, help workers better see and understand their own and collective work, which may increase their capacity to act (Bobillier Chaumon, 2021). For instance, food delivery apps can have features that couriers experience as supportive. Even opaqueness may enhance agency and strategic thinking if workers are pushed to question, study, and act on their ranking or matching mechanisms or uncertainties caused by complex algorithmic systems (Seppänen et al., 2023). But it is also possible that transparency allows platforms' algorithms to guide workers' agency by telling them how to act or what is a good attitude to have (Bobillier Chaumon, 2021). Therefore, transparency requires a critical audience both inside and outside organizations (Kemper and Klokman, 2018), and labour inspection can play an important role in this regard.

Working conditions in food delivery work, including high workload and related fatigue, piece-rate payment creating pressure to work quickly, and lack of organizational risk management, accentuate OSH risks (Christie and Ward, 2019). The autonomy and transparency paradoxes in platform work are closely linked to psycho-social risks of this type of work (Berástegui 2020, Perkiö et al. 2023; Ropponen et al., 2019). Although psycho-social risks are not often a cause for prosecution of labour protection offences, they are well recognized to produce ill health. Labour inspectorates' legal responsibilities and suitable preventive strategies are often unclear in the context of restructured and reorganized work and employment such as platform work.

24. Recent indicative survey results suggest that although not majority, still a number of platform workers in Finland depend on income from platforms. 16 percent of Finnish platform workers had chosen platform work either because other work was not available (seven percent), or because the work they wanted to do was available only via labour platforms (nine percent) (Pärnänen, 2023).

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Chapter 7

Conclusion: A risk factor framework for OSH, digitalization and forms of employment

Sondre Thorbjørnsen (Fafo) and Sigurd M. N. Oppegaard (Fafo)

7.1 Introduction

The aim of this research project and report has been twofold: First, we have sought to advance the empirical understanding of occupational safety and health (OSH) risk factors related to different forms of non-standard employment and digitalization, such as field technologies and digital platforms. Our second aim has been to use this knowledge to develop a risk factor framework that can be useful for Nordic labour inspectorates to assess potential risk factors at individual workplaces. This chapter endeavours to achieve this second aim, drawing on insights from the case studies, the scoping review (Bråten and Thorbjørnsen, 2023), feedback from the project workshops and other key sources.

At one of the project workshops with representatives from Nordic labour inspectorates,^[25] one of the participants argued that keeping up with new forms of platform-mediated gig work felt like “running after a quite rapid development”. Hopefully, the insights and proposals gathered in this chapter can contribute to “taming the treadmill” and strengthening the toolbox of the Nordic labour inspectorates. Accordingly, this chapter has been written to be accessible to an audience beyond the usual research community.

The chapter is structured as follows. First, we provide an overview of the relevant OSH dimensions (psychosocial and organizational) and some of the ways in which new technology has been reshaping OSH challenges. In [section 7.3](#), we present and discuss our risk factor framework. This framework is designed to provide labour inspectorates with a conceptual overview of potential risk factors and thereby be useful before and during inspections in digitalized work arrangements. A total of seven risk factors are discussed: isolation, deskilling, worker turnover, piece-rate precarity and stress, reduced autonomy, control and surveillance, and increased OSH fragmentation. The final section summarizes the risk factors and discusses regulatory challenges associated with OSH, digitalization and non-standard forms of employment.

7.2 Linking OSH, technology and forms of employment – risk factors

As this and previous research has shown, current rapid technological development has significant consequences for how work is conducted and how workplaces, labour processes and labour markets are structured and organized. As such, digitalization and other technological innovations can create new occupational safety and health risks (Cockburn, 2021; EU-OSHA, 2018; Oppegaard and Bråten, [Chapter 2](#)). At the same time, new technologies also recast and reiterate existing risk factors. Surveillance, for example, did not emerge as an OSH challenge with the introduction of monitoring technologies such as GPS tracking and digital devices, and time pressure at work is not in itself a result of algorithms assigning workers tasks. Moreover, the OSH risk factors created by new technologies coexist with those emerging from the labour processes. As Huseby shows in Chapter 3, cleaners working for digital platforms continue to be exposed to labour process-specific risk factors associated with cleaning while also working within the highly digitalized work arrangement of the platform. This highlights the importance, for researchers as well as labour inspectorates, of avoiding being blinded by the newness of digital technologies and letting “shiny new objects” obscure our assessment of the effects of technology at work.

A similar argument can be made regarding non-standard forms of employment, which have been characterized as OSH risks (Cummings and Kreiss, 2008; Howard, 2017; Oppegaard and Bråten, [Chapter 2](#)). Increases in the share of self-employed workers and other non-standard forms of employment have long been associated with emergence of the so-called new economy and “post-industrial society” (Lipset and Bendix, 1959). Today, the notion of the “Uberization” of the economy frames the development as one where workers no longer find permanent employment, only fragmented “gigs” (see Davis, 2016). Such generalizations have to be approached with caution. First, self-employment and non-standard forms of employment are not new phenomena; they were prevalent in the early phase of capitalism (Stanford, 2017) and in the major capitalist economies in the period before World War II (Steinmetz and Wright, 1989). Second, while the decline in self-employment rates in the post-war era was followed by a revival from the 1970s (Bögenhold and Saber, 1991; Steinmetz and Wright, 1989), non-standard forms of employment vary between different regulatory regimes and labour market models. In the Nordic countries, they have recently remained a stable and relatively marginal phenomenon (Rasmussen et al., 2019). There are, however, important differences between industries (Nergaard, 2018) and different forms of non-standard employment (Cools et al., 2023).

These nuances must be kept in mind when evaluating and analysing the potential effects of new technologies and work arrangements. The aim of this chapter and

our risk factor framework is therefore to show how OSH risks can be articulated through digitalization and across different forms of employment.

7.3 The risk factor framework

This section presents our risk factor framework and subsequently explains each risk factor in detail. Drawing on our previous literature review (Bråten and Thorbjørnsen 2023), previous research and evaluations (see Christensen et al. 2020, 2021; Foldal et al., 2023; Mattila-Wiro et al. 2020), the project workshops^[26] and our new empirical studies from the preceding chapters, we have identified seven key occupational safety and health risk factors associated with digitalization of work and non-standard forms of employment. These have been distilled into a risk factor framework (see [Table 7.1](#)).^[27]

An important aspect of our project has been to explore how technology-related risk factors are also affected by employment status. Non-standard forms of employment in general can constitute an independent risk factor, but this project has also shown that technology-induced risks are mediated and shaped by workers' employment status. The framework therefore distinguishes between risk factors for workers who are classified as employees and those who are self-employed. This is the key legal distinction in Nordic labour law, and it has significant consequences for workers', employers', and other authorities' rights and obligations (Alsos et al., 2022; Hotvedt et al., 2020). Importantly, self-employed workers are generally not covered by working environment legislation and have limited rights in relation to collective organization and negotiation, and labour inspectorates may have limited authority to require compliance with OSH standards and regulations. This, as will see below, tends to heighten the OSH risks for these workers.

The following framework therefore explores the interaction between digitalization and forms of employment, assessing the potential risk level for each identified risk factor for employed and self-employed workers. While it is important to highlight that new technologies in some cases can also lead to better OSH and safer and healthier working environments (see Christensen et al., 2020), this project is concerned solely with mapping OSH risks. We review each risk factor, first defining the risk and subsequently exploring the dynamics of employment status. Importantly, however, the risk factors identified remain merely risks and, as such, potential. In practice, workplaces and labour processes tend to exhibit their contextually specific dynamics – and the factors highlighted below must be investigated through close empirical inspection of the realities on the ground. The aim of this framework is therefore to explore tendencies immanent in the digitalization of work and non-standard forms of employment and map potential risk factors.

26. Representatives of the Nordic labour inspectorates were invited to two digital workshops (1 Dec 2022 and 7 Dec 2023) to share their experiences and to give input on the preparation of a conceptual risk factor framework.
27. A draft version was presented at a webinar with the Nordic inspectorates on 7 December 2023, and we are grateful to the participants for their constructive feedback.

Table 7.1 OSH Risk factor framework

Risk factors	Employed	Self-employed
Isolation	Risk of reduced interaction with colleagues and human managers through digitally enabled remote and mobile work	Risk of reduced human interaction and a lack of integration into workplace communities and relations through digitally enabled remote and mobile work
Deskilling	Reduced skill requirements and increased dependency on technologies, as well as reduced incentives to train and invest in workers	Heightened OSH risks for precarious workers in need of increased protection
Worker turnover	Increased fragmentation of the workplace making it more difficult to maintain and enforce OSH routines and legislation and reducing employers' incentives to provide high-quality jobs and workers' relative power	Increased fragmentation of the workplace making it more difficult to maintain and enforce OSH routines and legislation and reducing companies' incentives to provide high-quality jobs and workers' relative power
Piece-rate precarity	Economic unpredictability, low wages, and stress	Economic unpredictability, low wages, and stress, potentially combined with limited opportunities to bargain for better conditions
Reduced worker autonomy	Reduced job satisfaction, motivation, and job quality through standardization and routinization of the labour process	Standardization and routinization combined with a lack of worker rights and protections that tend to follow subordination
Control and surveillance at work	Opaque and unpredictable control and extensive and intensive monitoring leading to stress and degraded working conditions	Control and surveillance without protections that might limit hazardous effects
Increased OSH fragmentation	OSH standards and regulations can be difficult to enforce in digitally organized work arrangements	Workers might not be legally covered by OSH legislation and enforcement mechanisms

7.3.1 Isolation

The first risk factor associated with remote and lone work is isolation (Ropponen et al., 2019). As digital technologies open up new possibilities for remote work, workers have new opportunities to perform more work outside fixed workplaces. An example of this could be the use of home offices, made possible by digital co-working technologies, which has caused workers to become more physically disconnected from the office environment. Field technologies, furthermore, enable workers in a number of industries to perform their job while far away from a traditional workplace and colleagues (Tranvik and Bråten, 2015). The risk of isolation is also notable in platform-mediated gig work, as the empirical chapters on cleaning and food delivery show (see also Wells et al., 2021). Platform workers usually work alone, guided throughout the labour process by the platform technology, and previous studies have found that they report high levels of loneliness (Glavin et al., 2021).

This suggests that digitalization enables new work arrangements that can potentially reduce interaction and communication between workers within an organization and increase the risk of isolation (Bråten and Thorbjørnsen, 2023; Håkansta, 2022). This is in itself a psychosocial risk factor, but isolation can also heighten the risk of workers not being informed about or integrated into OSH work and routines. Remote and mobile workplaces, made possible by new digital technologies, can also make it more difficult for labour inspectorates to ensure compliance with OSH standards and regulations.

Isolation is a risk factor for both employed and self-employed workers in digitalized work arrangements. There is, however, reason to assume that the OSH risks associated with isolation tend to be greater for self-employed workers. Being self-employed, they are individualized and do not formally have any colleagues or a fixed or virtual workplace community (Ropponen et al., 2019). Still, empirical case studies find that platform workers in many cases nonetheless come together, build communities and mobilize collectively, despite their self-employment and dispersed labour process (see for example Tassinari and Maccarrone, 2020). This is also the case in the Nordic countries, and our case study of platform-based food delivery in Denmark and Norway found that workers engage with each other in the field (Jesnes and Rasmussen, [chapter 5](#)).

7.3.2 Deskilling

A second OSH risk factor associated with the digitalization of work is "deskilling". The notion of deskilling refers to the reduction of skill requirements for performing a job. Deskilling has been identified as a tendency linked to the implementation of new technologies in the labour process as this might simplify work tasks and lower competency requirements, thereby making it possible for employers to cut costs by

replacing higher paid workers with lower paid “unskilled” workers (Braverman, 1974). While there is little evidence of a tendency towards broad deskilling in the Nordic labour markets at an aggregate level (Rolandsson and Dølvik, 2021), this dynamic can still be found in specific workplaces, where the digitalization of work tasks and labour processes can be organized in new ways, reducing competence requirements (Schaupp, 2022b; Shibata, 2023).

Digital technologies might, for example, be used to guide workers throughout the labour process, continuously and flexibly providing directions. Thus, digitalization reduces the requirement for labour process-specific skills and language knowledge, as well as reducing the need to provide workers with formal and informal training. Gig platforms’ “algorithmic management” and field technologies in logistics illustrate their digital capacity to give workers instructions in real-time (Oppegaard, 2023; Oppegaard and Bråten, [Chapter 2](#); Vallas et al., 2022). Such digital technologies might therefore enable recruitment of “unskilled” workers, facilitating the exploitation of already marginalized segments of the labour force (Altenried, 2022). This is clearly the case in platform-mediated gig work, where workers often are migrants, who have few other labour market opportunities and come to their “gig” from unemployment or other precarious jobs (Huseby, [Chapter 3](#); Jesnes and Oppegaard, 2023; Jesnes and Rasmussen, Chapter 5; Seppänen, [Chapter 6](#)).

Deskilling can be considered an OSH risk factor insofar as it increases workers’ dependence on technology, reduces employers’ and companies’ incentives to invest in their workers’ competencies, and shifts the power balance between workers and employers in favour of the latter. OSH risks might also be heightened as workers are recruited from precarious positions in the labour market, who can be in increased need of protections, without being integrated into a workplace community, as discussed above in context of the risk of isolation. As we will see below, deskilling can also contribute to higher turnover rates and reduced worker autonomy.

7.3.3 Worker turnover

A risk factor closely related to deskilling is that of worker turnover. Implementation of new technologies might increase turnover rates, under certain conditions and if they, for example, increase the pace and stress of work, reduce autonomy or are used for surveillance (Christensen et al., 2020). More generally, however, technologies that are used to standardize the labour process and reduce knowledge and skill requirements can make it easier and cheaper to replace workers, facilitating flexible and scalable workforces (Altenried, 2020). Such a tendency is likely to be reinforced when technological deskilling is combined with non-standard forms of employment, which themselves are found to lead to greater worker turnover (Schulte et al., 2019).

While physically hazardous working conditions and injuries at work can increase worker turnover (Cottini et al., 2011; McCaughey et al., 2013), high turnover rates can themselves, indirectly, constitute an OSH risk factor. First, worker turnover and the flexibilization of organizations can make workplaces increasingly fragmented. On the one hand, this can make it more difficult to sustain efficient OSH routines. On the other hand, it can also make labour inspectorates' enforcement of OSH legislation increasingly complicated. Second, high turnover rates and the ease of replacing workers can reduce employers' and companies' incentives to provide a work environment that promotes OSH. Furthermore, a digitalized work environment that facilitates high worker turnover and replaceability of workers might also increase employers' and companies' relative power over workers, limiting workers' capacity to demand a safer and healthier work environment.

7.3.4 Piece rate precarity and stress

By enabling efficient coordination, digitalization makes new organizational forms possible. As we have seen, one tendency is more fragmented workplaces, associated particularly with platform-mediated gig work (Davis, 2016). In these work arrangements, workers are classified as self-employed contractors and paid per "gig" they compete. Digitalization of work, particularly the rise of platform-mediated gig work, has thus led to a resurgence of the piece rate model (Moore and Joyce, 2020; Stanford, 2017). Piece rates should not be seen as a consequence of digitalization, but rather as a managerial technique made possible by the increased fragmentation of organizations and workplaces facilitated by new technologies.

Research has shown that platform workers tend to earn relatively low and unpredictable wages (Piasna et al., 2022). Since they are paid a piece rate, they also adjust their work schedules to demand, often having to work unsocial and long hours to make a living (Jesnes and Oppegaard, 2023; Oppegaard, 2021, 2023), which can constitute a significant OSH hazard (Samant, 2020). Moreover, and as the empirical analyses in the previous chapters show, unpredictable earnings are a significant stress factor for some platform workers (Huseby, Chapter 3; Jesnes and Rasmussen, [Chapter 5](#)). Digitalization of work, when combined with fragmented organizational and payment models, might therefore lead to what can be termed piece rate precarity and stress. This is a psychosocial risk factor prevalent in platform-mediated gig work (Bérastégui 2021; Lenaerts et al., 2021).

For self-employed workers, however, the piece rate model is generally nothing new. Self-employed workers in non-digital work arrangements also tend to be dependent on demand for the services they sell to earn an income. This is the case with taxi owners, for example, who in most markets were classified as self-employed business owners long before the rise of platforms such as Uber (see Aarhaug et al., 2020). While traditional self-employed workers in many industries

are able to determine their own prices, and thus influence their wages, self-employed workers in the platform economy generally have little to no influence over the price of their services, increasing their dependence on fluctuations in demand and the unpredictability of their income. Piece rate models can also be combined with traditional employment relationships. In these cases, workers are usually legally allowed to unionize and bargain collectively, increasing their influence on their earnings and potentially limiting the precarious effects of the piece rate model. The case of the food delivery platform Foodora in Norway, some of whose workers are classified as employees and signed a collective agreement after a strike in 2019, illustrates this (see Jesnes and Oppegaard, 2023; Jesnes and Rasmussen, [Chapter 5](#)).

7.3.5 Reduced worker autonomy

As we have seen above, digital technologies can be used to standardize and routinize the labour process, leading to reduced worker autonomy (Schaupp, 2022b; 2022a). Autonomy has been found to be a work characteristic that promotes job satisfaction, motivation and high-quality jobs (Parker et al., 2001), and it constitutes an important aspect of the psychosocial work environment (Christensen et al., 2020).

As we will see in the next section, reduced worker autonomy through digitalization of work is a pertinent issue in platform-mediated gig work, where gig platforms often exercise significant control over the labour process through "algorithmic management" (Lee et al., 2015; Moore and Joyce, 2020; Oppegaard, 2023; Oppegaard and Bråten, [Chapter 2](#)). Platform workers are often recruited by the promise of flexibility and autonomy (Jesnes and Oppegaard, 2023; Seppänen, [Chapter 6](#)), but in the labour process they are subject to digital control techniques that in practice limit their capacity for autonomy (Altenried, 2020). The formal flexibility gig platforms promote has therefore been described as a "fictitious freedom" (Shibata, 2020).

The potentially negative consequences of reduced worker autonomy through digitalization are likely to be exacerbated if workers are classified as self-employed contractors. This employment status is fundamentally based on service providers having flexibility and autonomy to determine the conditions under which they work – such as when and how long they work, how they perform their labour and so on. This freedom legitimizes the lack of regulation of their working environment. For self-employed workers, significant OSH risks might therefore arise when their labour processes are controlled by digital technologies that limit their flexibility and autonomy without them being granted the rights and protections following from traditional employment relationships.

On the other hand, new technologies can also be used to *increase* workers' autonomy (see Christensen et al., 2020; Leso et al., 2018). For example, if new

technologies are deployed to automate physically demanding and monotonous tasks, workers might gain increased autonomy and supervise and monitor semi-autonomous production systems to a greater extent. This can increase workers' capacities for decision-making and required skills. As such, this process can be termed "upskilling". This scenario illustrates that the effects of new technologies remain open-ended and highlights the importance of investigating how particular technologies are used in practice in specific cases.

7.3.6 Control and surveillance at work

As work becomes more digitalised, and data is generated and processed in real time, there are new possibilities to monitor, control and coordinate workers' labour processes. In the case of platform-mediated gig work, this form of control is often labelled "algorithmic management" (Lee et al., 2015; Wood, 2021). The fact that new technology has implications for control and coordination is not new, but what is important with new *digital* technology is the way in which it generates an increasing variety of information (data) in real time, which could potentially be misused for negative control and surveillance at work (Oppegaard and Bråten, [Chapter 2](#)).

Gig platforms control workers through a triadic constellation of algorithmic task assignment, economic incentives and rating systems (Lee et al., 2015), usually combined with organizational techniques such as piece rate payment and self-employment (Moore and Joyce, 2020; Oppegaard, 2023). In these work arrangements, workers' earnings and working time are shaped by the technological determination of the number of available tasks and prices. Workers also risk being "deactivated" if they receive poor ratings. "Algorithmic management", sometimes described as a form of "digital Taylorism" (Altenried, 2020), furthermore operates through mechanisms that often are experienced as opaque from the perspective of workers, who often have limited opportunities to discuss or dispute the platforms' decisions (Oppegaard and Jesnes, forthcoming; Seppänen, [Chapter 6](#)). The empirical analyses in the preceding chapters show that this form of control can create a significant stress for workers and should be regarded as an OSH risk factor (see also Bérastégui, 2021; Randolph, 2019; Samant, 2020).

Beyond the specific case of platform-mediated gig work, however, digitalization of work and the use of field technologies enables more extensive and intensive forms of surveillance (Tranvik and Bråten, 2015). As an increasing number of the aspects of workers' labour process are recorded digitally and in real-time – including output, movements, keystrokes and biometrics – new features of workers and their work can be monitored. The increased surveillance capacity enabled by new technologies can therefore constitute a key OSH risk factor in digitalized work arrangements.

The OSH dimensions of control and surveillance, however, also vary depending on workers' employment status. In contrast to self-employed workers, employed

workers are more likely to be protected by legislation curbing potentially hazardous effects of control and surveillance. They might also have access to representatives that can negotiate whether, what, and how new technologies are implemented (Andersen and Bråten, forthcoming).

7.3.7 Increased OSH fragmentation

A common thread among the points discussed above relates to how digitalization reshapes the relationship between companies and workers, both formally and in the labour process, and how this in turn is linked to OSH. A final important OSH risk factor identified relates to the regulation and enforcement of OSH standards and routines: the potential of increased OSH fragmentation.

First, the new types of work arrangements, flexible organizations and new forms of control that digital technologies enable can make it more difficult to ensure that workers and their work environments are encompassed by OSH standards and routines. This is an issue that pertains to both companies and labour inspectorates. Workers might, for example, work outside fixed workplaces, work alone and outside the purview of human managers and colleagues, have short tenure in an organization or be subjected to opaque forms of digital management. Such factors can make it complicated for companies to organize OSH routines and for workers to know their rights.

Second, non-standard forms of employment – whether combined with a digitalization of work or not – are an OSH risk factor because workers might not be covered by working environment legislation. This can fragment OSH responsibilities. In some cases, these might be shifted onto the workers themselves, which can be particularly problematic if workers are subject to fluctuations in demand and potentially dependent on long working hours to make a living. For the labour inspectorates, non-standard forms of employment might mean, moreover, that they do not have the authority to enforce OSH standards and routines (see Jesnes and Rasmussen, [Chapter 5](#)).

7.4 Concluding remarks

The above framework has highlighted seven key occupational safety and health risk factors associated with digitalization of work across different forms of employment: isolation, deskilling, worker turnover, piece rate precarity and stress, reduced autonomy, control and surveillance, and increased OSH fragmentation. The framework, the discussion of the risk factors and our empirical analysis in the previous chapters of this report suggest that non-standard forms of employment, in particular self-employment, heighten the OSH risks arising from the digitalization of work.

Importantly, the framework only identifies OSH risk factors and thus *potential* hazardous work environment exposures. Actual outcomes depend on a myriad of different factors and must be assessed in practice and within specific contexts. This chapter has nonetheless shown that the digitalization of work poses significant challenges to workers' OSH through the use of new tools and technologies in the labour process, new forms of digital control, new and flexible work arrangements and the facilitation of non-standard forms of employment. These challenges are illustrated particularly clearly in the case of platform-mediated gig work.

The future of work will depend on many other factors besides technology alone – but new technologies can be a catalyst of change in the world of work. This requires that we pay close attention to both their potential and actual effects. The current surge in the development and implementation of so-called artificial intelligence technologies is but one example of a process that has to be monitored attentively from an OSH perspective. As this report has highlighted, technologies do not necessarily create only new OSH challenges: They also, and in many cases more importantly, reshape and reiterate well-known work environment risks. This indicates that authorities tasked with regulating and enforcing OSH standards and routines are not starting from scratch when approaching the risk factors introduced by digitalization, for example. Furthermore, industry- and labour process-specific risk factors are likely to remain key risk factors for workers in digitalized work arrangements, as our case studies of platform-mediated gig work in cleaning and food delivery show (Huseby, [Chapter 3](#); Rasmussen, [Chapter 4](#); Jesnes and Rasmussen, [Chapter 5](#)). In addition, it is also crucial to mention that new technologies can contribute to a safer and healthier work environment for workers. This has not been the focus of this project, however, and more research on how digital technologies can improve OSH is needed. However, ensuring safe and healthy work environments still requires that the transformations of work brought about by new technologies be continuously monitored.

Nonetheless, there are regulatory challenges associated with OSH, digitalization, and non-standard forms of employment. First, as employers and companies continue to develop and implement new technologies, regulations must ensure that these in themselves and the ways in which they are used do not pose OSH hazards to workers. Digital control and surveillance are issues that might be particularly pertinent in this regard, and it is imperative to make sure that existing OSH regulations are upheld and enforced in the context of new technologies. A second challenge revolves around non-standard forms of employment. OSH for workers in non-standard forms of employment is particularly precarious as working environment legislation is tied to employment status in many cases, potentially excluding atypical workers from necessary protection. While these challenges are not new, as we have emphasized, the possible misclassification of workers as self-employed contractors rather than employees has become a key issue in labour law over the last few years, exacerbated by the rise of platform-mediated gig work

(Hotvedt et al., 2020). A third regulatory challenge pertains to ensuring that OSH standards and routines are upheld and enforced in fragmented work arrangements. Facing these predicaments, it might be necessary to develop regulatory responses at the national and supranational levels, as well as through collective agreements at the industry and workplace levels. The latter strategy, however, requires that unions be able and permitted to take an active role in decisions regarding technologies at work (Andersen and Bråten, forthcoming; Hagen and Oppegaard, 2020).

Finally, it is important to facilitate labour inspectorates' capacity to enforce OSH standards and regulations in an unpredictable and rapidly changing world of work. Previous reports have shown that there is untapped potential for cross-country collaboration between the Nordic inspectorates (Foldal et al., 2023; Mattila-Wiro et al., 2020; Ødegård and Eldring, 2016). Hopefully, the risk factor framework developed in this chapter – and the analysis from the project more broadly – can contribute to “taming the treadmill” and assisting Nordic labour inspectorates in keeping up with the effects of the high-paced digital transformation.

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Mona Bråten
Johanne Stenseth Huseby
Kristin Jesnes
Sigurd M. N. Oppegaard
Stine Rasmussen
Laura Seppänen
Sondre Thorbjørnsen

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