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Platform Work and Algorithmic Management

Risks, Regulation and Solutions for Occupational Safety and Work

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Risks, Regulation and Solutions for Occupational Safety and Work

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Introduction

1 Platform Work and Algorithmic Management

Digital work platforms have become a visible part of our working lives. Food delivery riders, ride-hailing drivers, online freelancers, warehouse workers and other platform workers now perform work that is being directed, evaluated and rewarded through digital systems. These systems tend to rely on algorithmic management: the atomisation of tasks that traditionally were all performed by a human manager. Algorithmic management is now responsible for influencing when workers receive tasks, how quickly they are expected to complete them, how their performance is evaluated, and in extreme cases whether they gain access to future work. In the EU, it is now estimated that around 42.3 % of workers may be subject to algorithmic management[1].
The aim of this book is both analytical and practical. It brings together evidence from multiple countries to clarify how platform work and algorithmic management affect OSH. It also identifies opportunities for improvement. By combining legal analysis, empirical insights, technical perspectives and practical safety recommendations, the book contributes to a wider European discussion on how to ensure that digital labour platforms develop in ways that are not only efficient and innovative, but also fair, transparent, healthy and safe.

This manuscript is a deliverable of the SAF€RA project '*Occupational safety-related challenges in algorithmic management and solutions for fair work within digital labour platforms*', commissioned by the SAF€RA network, the participating partners and their funding partners. The project brings together European partners with expertise in occupational safety and health (OSH), platform work, labour regulation, technology, safe mobility and safety learning. The consortium for this project consists of The Netherlands Organisation for Applied Scientific Research (TNO), the Finnish Institute of Occupational Health (FIOH), The Spanish Technology Platform on Industrial Safety (PESI) and The Norwegian University of Science and Technology (NTNU). Across these national contexts, the project addresses one central research question: "*Which factors influence the occupational safety for platform workers and to what extent are these factors influenced by legal/ policy, technical or learning instruments?*"

The project focuses primarily on on-location digital platform work, especially food delivery work, while also considering the relevance of the findings for alternative workplaces, such as; warehouse work, logistics and other forms of digitally mediated work. Food delivery is a particularly important case for studying the relationship between algorithmic management and OSH. Delivery workers operate primarily in public spaces, often in traffic environments and under time pressures. Their work is coordinated through platform applications, and their income, task access and performance evaluation may be affected by digital monitoring, customer ratings, rankings, automated task allocation and payment systems. These features make delivery work both a visible example of platform work and a practical case for understanding how algorithmic management can affect safety, health and wellbeing.

[1] European Parliament (2025): https://www.europarl.europa.eu/RegData/etudes/STUD/2025/774670/EPRS_STU%282025%29774670%28ANN01%29_EN.pdf

This book is organised around the four subthemes of the SAF€RA project which contribute towards answering the main research question. Part 1 focuses on safety learning from laws. It examines the legal and practical safety consequences of platform work and algorithmic management in the four different national contexts, with particular attention to regulation such as the EU Platform Work Directive[2] and its implications for employment status, transparency, human oversight, data protection and OSH.

Part 2 focuses on learning from risks. It investigates the OSH risks experienced by delivery workers and the ways in which algorithmic management can contribute to, amplify or potentially reduce these risks. The chapter draws on literature and interviews with delivery workers and stakeholders. All four national contexts have provided their perspectives and research on this subtheme.

The following chapters in Part 3 move from identifying risks towards more practical responses and learning processes. This part explores safety learning from solutions, examining how platforms and related actors can improve transparency, strengthen workers' safety, and how platform software's could be designed to support rather than undermine safety.

Part 4 deals with safety learning on the job, exploring how platform workers, platform companies, and other organisations learn about safety in practice, including through training, everyday work routines, peer interaction and organisational support.

Finally, the conclusions brings together the insights from across the book and shifts the focus from learning within work practices to the broader lessons for the future of platform work. It considers what needs to be learned, or relearned, as digital platform work continues to evolve, and reflects on how legal, technical and organisational measures can contribute to safer and fairer forms of platform work.

Across these sections, the book addresses the following sub questions of the project:

- What are the (potential) legal and practical safety consequences for employers and platform workers of the algorithmic management chapter within the EU Platform Directive?
- What are the occupational safety benefits and risks and what are the potential solutions to maintain the benefits of platform work for occupational safety while mitigating the risks?
- To what extent is it possible to classify distinct software functionalities, -algorithms or data in a platform to be supportive for occupational safety, harmful for occupational safety and/or relevant for oversight by regulators and workers?
- What are the state-of-the-art and challenges of workers' on-the-job learning related to safety and safety management in platform work, and what platform features promote or hinder this learning?
- What solutions are suggested to develop continuous safety learning and safety management on an inter-organisational level between platforms, workers and clients?

The intended readership of this book extends beyond the research community, namely policy makers, regulators, labour inspectors, OSH professionals, social partners and platform organisations who are concerned with how digital labour platforms can be governed in safer

[2] European Parliament and Council of the European Union. *Directive (EU) 2024/2831 of 23 October 2024 on improving working conditions in platform work*. Official Journal of the European Union, L, 2024/2831, 11 November 2024. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32024L2831 [Accessed 22 September 2026].

and fairer ways. Its contribution lies in connecting evidence from different countries and disciplines with practical questions of regulation, oversight and prevention. As such, the book can support the commissioning organisations in its policy-oriented work by providing grounded insights into how legal, technical and organisational measures may help address occupational safety risks in platform work.

Preface

This book is the result of work carried out within the SAF€RA project '*Occupational safety-related challenges in algorithmic management and solutions for fair work within digital labour platforms'*, which began in 2022. Over the course of the project, the world of platform work, algorithmic management and related regulation continued to develop rapidly. For this reason, some of the legal references, policy developments, platform practices or contextual details discussed in the chapters may have changed since the original research and writing were completed in year 2026. Rather than presenting a fixed endpoint, the book should therefore be read as a contribution to an ongoing discussion about how digital labour platforms can be organised in ways that support fairer, safer and healthier work.

We would like to thank all chapter authors and project partners for their contributions, collaboration and patience throughout the development of this manuscript. We are also grateful to the workers, platform representatives, experts, policymakers and other stakeholders who shared their experiences and insights during the project. Their input helped ground the work in the realities of platform-mediated work. Finally, we would like to thank the SAF€RA network, the participating partners, their funding partners and also express our special thanks to Peter Oeij (TNO) for his valuable guidance and for carrying out the final edits of this book.

Part 1: Safety learning from laws

2 The Netherlands: Labour Laws for Platform Workers

The Dutch Labour Laws on the Employment Relationship and Platform workers

Jan Harmen Kwantes, Niels Held, Dolf van der Beek & Martijn Arets

Abstract — This article discusses the distinction between employment contracts and service agreements in Dutch labour law, emphasising the challenges posed by delivery platform companies and delivery platform workers using algorithms to control workers. The legal debate centres on whether platform workers are employees or independent contractors, with implications for tax, social contributions, and compliance with public law rules. Recent Dutch case law, particularly the Deliveroo Supreme Court ruling, has often favoured the classification of platform workers as employees, considering factors like the nature of work, payment, and the degree of authority exercised by the company. The European and Dutch legislative initiatives aim to clarify these employment relationships and reduce the need for court resolution, with a recent EU directive proposing a legal presumption of employment under certain control criteria. The Dutch draft legislation seeks to further define the assessment of employment relationships, focusing on work-related management, organisational embedding, and whether the work is performed at one's own expense and risk. The success of these legislative efforts remains uncertain, with the outcome likely to impact the classification of platform workers significantly.

Keywords — Algorithmic Management, Dutch Court cases, Employment Relationship, Platform Work.

INTRODUCTION

In Dutch labour law, there are two main forms of employment relationships that can be distinguished from one another, namely, the contract for services and the employment contract. The assignment agreement forms the basis for independent entrepreneurship and is used between a client and a contractor (self-employed person without employees). The employment contract regulates the relationship between an employer and an employee who is hired. These two forms of employment are included in the Dutch Civil Code [1]. As soon as there is an employment contract, mandatory labour law, social security law, and tax law rules apply, such as the right to continued payment of wages and protection against dismissal, minimum wages, safety and health, taxes and social security rules.

The platform economy is an overarching term that encompasses online platforms, also known as online marketplaces, which mediate between the supply and demand of individual users for

goods and services. A subset of this platform economy is the gig economy, defined as “online platforms which mediate the independent contractors (the platform worker) with platform clients for paid services” [2].

Much attention in the debate and literature on the gig economy has focused on the ‘poster child’ platforms for on-demand services with a high impact of algorithmic management, such as taxi (“ride-hailing”) platforms like Uber and Bolt, and delivery platforms like Deliveroo, Glovo, Wolt, and UberEats. While this focus is understandable due to the significant impact of technology on work and entrepreneurship, it is important to recognise that the gig economy encompasses many variations, each impacting the organisation of work and the risks faced by workers in different ways.

In the Dutch market, 93 online gig economy platforms are active, with the hundreds of platforms facilitating non-location-bound online work, thus available to virtually all workers worldwide, barely accounted for [3]. The focus of this book/chapter is on platforms operating in the domain of meal delivery. Unique to this type of platform is that they do not mediate between two parties, but three: the restaurant, the courier, and the customer.

Even within the domain of meal delivery, there are various models and variables. In many cases, couriers work as freelancers, but there is an increasing number of platforms that employ couriers directly or through an employment agency. Additionally, there are platforms where the meal ordered via the app is delivered not by a platform-employed courier, but by a courier employed by the restaurant. While freelance couriers are paid per delivery, employed couriers are paid per hour. Most couriers working via platforms decide for themselves where they wait for the next order (in public spaces), although some platforms have their own hubs where couriers gather. It also varies by platform (and sometimes even within the same platform) whether the courier uses their own equipment or if it is provided by the platform. This makes it important to realise that the situations and consequences described in this chapter do not apply, or do not apply to the same extent, to all couriers working via platforms. It is also not uncommon for platforms to adjust their model, as happened during our research.

The core of the problem

Platform companies, such as food delivery services, use algorithms for their platform employees work. Platform employees are controlled using these digital systems. The legal core of the discussion regarding the position of platform employees in many EU countries is:

Do the platform employees have an employment contract or are they independent contractors who work on the basis of an assignment agreement?

This seems purely a fundamental employment law issue, but in a practical sense it is not. The consequences of being self-employed relate to:

- Paying less tax;
- Less mandatory payment of social contributions, e.g. no premium for employee insurance;
- Less burden from public law rules, such as the Working Conditions Act (referred to in the Netherlands as: Arbeidsomstandighedenwet or Arbowet [2]).

It can be attractive for both a company and an independent contractor to qualify an employment relationship as a client-contractor relationship, as it is cheaper or it yields more net. Platform companies make extensive use of the client-contractor relationship. They thereby argue that these contractors are independent contractors. Trade unions (and others) believe that there is

a false sense of self-employment, because in their view these platform workers are not independent entrepreneurs at all, but ordinary employees with an employment contract [3].

Employment relationship qualification

This discussion about the so-called qualification of the employment relationship (is there an employment contract or a services agreement?) has been frequently submitted to the courts in recent years. It has often been decided that platform workers are employees on the basis of an employment contract.
In order to classify an employment relationship as an employment contract within the meaning of Article 7:610 of the Dutch Civil Code, it is required that an employee, in the service of an employer, performs work in return for payment of wages for a certain period of time. The three elements of the employment contract follow from this definition:

1. Labour
2. Wage
3. Work in the service of an employer (authority relationship)

Opinions differ less about the elements of labour and wages, but the element of 'relationship of authority' must often demonstrate whether there is a services agreement / agreement for services or an employment contract. The only question is, under what circumstances can authority be exercised over an employee?

The social discussion in the Netherlands has been conducted primarily through case law. The trade union FNV alone or in conjunction with CNV (another trade union in the Netherlands) in particular has conducted a number of lawsuits to gain clarity on this matter. For instance against online platform Temper [4a]. Trade unions FNV and CNV seek a judicial determination that workers engaged through the Temper platform should be classified as temporary workers or employees. This classification would ensure that these individuals receive essential protections, such as health benefits and pension accrual. Conversely, Temper contends that it does not function as an employer, asserting that individuals who secure work via its platform are self-employed. This legal dispute centres on the nature of the employment relationship facilitated by Temper. The judge determined that Temper does not qualify as an employment agency and refrained from making a ruling on whether the clients utilizing Temper’s services are considered employers. Consequently, the judgment established that Temper is not an employment agency, but it did not address the employment status of the workers as freelancers [4b]. However, the court case against Deliveroo by FNV is the largest one, more about that one below but in essence that case is around the same issue but for different online platform work [5].

European and Dutch Legislative Initiatives

European and Dutch governments are trying to develop legislation to provide clarity for employers/clients and employees/contractors. The European Platform Work Directive is one of these new legislations. A first draft of the EU directive on improving employment conditions in platform work was published in 2021 [6]. The intention of the directive is to harmonise legislation within the EU. The directive introduces a rebuttable legal presumption of employment in Article 5(1):

“The contractual relationship between a digital labour platform and a person performing platform work through that platform shall be legally presumed to be an employment relationship

where facts indicating direction and control, in accordance with national law, collective agreements or practice in force in the Member States and with consideration to the case-law of the Court of Justice, are found. Where the digital labour platform seeks to rebut the legal presumption, it shall be for the digital labour platform to prove that the contractual relationship in question is not an employment relationship as defined by the law, collective agreements or practice in force in the Member States, with consideration to the case-law of the Court of Justice."

At the end of 2023, there appeared to be no agreement between the Council and the European Parliament on this draft directive. Despite a new attempt to reach agreement on this draft directive at the beginning of February 2024, this second attempt also did not seem to succeed [7]. It therefore appeared that this European legislative initiative on platform work is failing. But ultimately, agreement was reached between the Member States on a draft platform directive in early March 2024 [8]. On the 14th of October 2024 it was announced that the Council has adopted the new Platform Work Directive [9]. After formal consent from the Council and the European Parliament these parties Member States will then have two years to transpose these provisions into their national law. The situation outlined above, namely that of a rebuttable legal presumption of an employment, continues to exist. The requirements regarding managing personnel via algorithms also remain intact, such as:

- monitoring and evaluating automated decisions;
- the platform being prohibited from using said monitoring and automated decisions for the processing of personal data relating to the emotional or psychological state of a person, a in relation to private conversations (including exchanges with other persons performing platform work and the representatives of persons performing platform work), or to collect any personal data of a person performing platform work while that person is not offering or performing platform work;
- the platform must provide a written explanation of the decisions made;
- important decisions influenced or made by an algorithm, such as compensation, suspension or dismissal of an account will have to be monitored by a person.

Dutch draft law clarifying the assessment of employment relationships and legal presumption

In October 2023, the draft bill was placed on the website internetconsultatie.nl by the outgoing Minister of Social Affairs and Employment [9]. The question is whether this draft bill' will be adopted by a new cabinet and sent to the House of Representatives. In this draft bill, article 7:610 of the Dutch Civil Code (regarding the employment contract) is supplemented with the following provisions:

2. *Carrying out work in the service of an employer as referred to in the first paragraph occurs if:*
   a. *the work is performed under work-related direction by the employer, or;*
   b. *the work or the employee are organisationally embedded in the employer's organisation, and;*
   c. *the employee does not perform the work at his own expense and risk.*
3. *If work-related direction or integration into the organization of the employer, as referred to in paragraph 2, parts a and b, is present and moreover is more significant than performing the work for one's own account and risk, the work is performed in the service of an employer*.

These general rules are further specified (“coloured”) in a general administrative order. This draft bill clarifies the open standard in service of Article 7:610, paragraph 1 of the Dutch Civil Code. The most important indications are then included (by order in council) that colour the three main elements. These indications that fill in the main elements are also derived from case law. The concept of employee developed in European case law has also been taken into account. These main elements (in the law) and indications (in an order in council) will from now on form the framework on the basis of which it will be assessed whether there is work in the service of someone else and (conversely) whether work can be performed outside an employment contract.

A. Work-related management:
   1. *The employer is authorised to give directions and instructions about how the worker must carry out the work and the worker must also follow these;*
   2. *The employer has the opportunity to monitor the worker's activities and is authorised to intervene on that basis*

B. Organisational embedding:
   1. *The work is performed within the organisational framework of the employer's organisation.*
   2. *The work is part of the core activity of the organisation*
   3. *The work has a structural character within the organisation*
   4. *Work is performed side-by-side with employees who perform similar work.*

C. Own account and risk:
   1. *The financial risks and results of the work lie with the worker.*
   2. *When carrying out the work, the worker is responsible for tools, aids and materials.*
   3. *The worker has specific training, work experience, knowledge or skills that are not structurally present in the employer's organisation.*
   4. *The worker goes outside independently during the work*
   5. *The assignment has a short duration and/or a limited number of hours per week.*

C+ (Supplementary) Whether the worker generally behaves as an entrepreneur or employee in economic transactions with regard to comparable activities.
   This could include, for example:
   - *The worker has several clients per year;*
   - *The worker spends time and/or money on gaining a reputation and finding new customers or clients;*
   - *The worker has business investments of some size;*
   - *The worker behaves administratively as an independent contractor: is registered with the Chamber of Commerce, is a VAT entrepreneur and/or is entitled to the tax benefits of entrepreneurship (such as entrepreneurial facilities)*

If this is not the case or only to a limited extent, then there is a worker who generally behaves as an employee in economic transactions.

The question is whether the proposed legislation will pass once it is presented in the Dutch parliament, especially since it comes from a cabinet that was recently replaced following the 2023 elections in the Netherlands.

Dutch Case Law

In the current situation, and in the absence of legal rules and lack of enforcement on qualifying the employment relationship, workers and platform companies are forced to go to court. This has already happened several times in the Netherlands, with the FNV trade union crossing swords with various platform companies. The best-known example of such a legal procedure

was the food delivery platform company Deliveroo ruling of March 24, 2023 by the Supreme Court of the Netherlands [5]. The FNV trade union and the platform company were opposed to each other. This judgment is illustrative of the current state of affairs regarding the qualification of the employment relationship within a platform company. Particularly with regard to the element of authority in the employment relationship, the highest court in the Netherlands has concluded the following:

1. *It can be deduced from the case law of the Supreme Court that the performance of ordinary company work can indicate a relationship of authority. Meal delivery is a core activity of Deliveroo.*
2. *Deliveroo always changes the content of the contracts and the way in which the work is organised unilaterally. This also indicates that Deliveroo exercises authority over the delivery drivers.*
3. *Once a delivery person is logged in, the GPS location is continuously monitored. The GPS system gives Deliveroo extensive control over the delivery person's working methods. This GPS tracking also puts pressure on the delivery person. The GPS system therefore gives Deliveroo (whether or not through its customers) a far-reaching control option, which can also be regarded as a form of authority.*
4. *Deliveroo has a major influence on the way in which work is carried out due to the 'Frank' algorithm that it has designed and continuously adjusts. Awarding bonuses increases Deliveroo's ability to influence the behaviour of the delivery drivers (for example, accepting rides that the delivery drivers would not have accepted without that bonus). The payment model unilaterally adopted by Deliveroo also indicates far-reaching involvement by Deliveroo in the delivery process, and is therefore an indication of authority.*
5. *Deliveroo has pointed out that the delivery drivers must carry out their work with their own means of transport and that they are free to use their own 'gear' (delivery bag and (rain) clothing). FNV has stated that the means of transport in this case (usually a bicycle) is an object of daily life and therefore does not indicate an investment by an entrepreneur. FNV further points out that Deliveroo encourages it to use 'gear' provided by Deliveroo, as the items offered by Deliveroo are of good quality and are offered at a discount and delivery drivers therefore often choose to use them.*
6. *Deliveroo has not convincingly disputed that restaurants and customers view delivery drivers as part of Deliveroo, and not as independent contractors. The regulations drawn up by Deliveroo also assume that the deliverers must be recognisable as Deliveroo deliverers. For example, customers can submit a complaint to Deliveroo about a specific delivery person. This is not possible if the customer does not know that the delivery person works for Deliveroo*.

Together with a multitude of other arguments, the Supreme Court comes to the conclusion that Deliveroo employees work on the basis of an employment contract. The Supreme Court formulates a (non-complete) overview of the elements that lead to this conclusion as follows:
Whether an agreement should be regarded as an employment contract depends on all the circumstances of the case taken together. Important may include:

- *the nature and duration of the work,*
- *the way in which the activities and working hours are determined,*
- *the embedding of the work and the person who carries out the work in the organisation and business operations of the person for whom the work is carried out,*
- *whether or not there is an obligation to carry out the work personally,*
- *the manner in which the contractual arrangement of the parties' relationship was established,*

- *the manner in which the reward is determined and how it is paid, the amount of these rewards,*
- *and the question of whether the person carrying out the work runs a commercial risk*.

Additional elements:

- *whether the person who carries out the work behaves or can behave as an entrepreneur in economic transactions, for example when acquiring a reputation, during acquisition, with regard to tax treatment, and taking into account the number of clients for whom he works or has worked and the duration for which he usually commits himself to a specific client*.

Immediately noticeable is the disadvantage of the case law with regard to this matter. It is highly dependent on the case and the so-called circumstances of the case.

METHODS

The following section outlines the methodology employed to address the research objectives of this chapter by further researching the topic of legislation regarding platform work by means of several interviews with relevant stakeholders on the subject matter. It details the systematic approach undertaken to collect, analyse, and interpret data in order to provide a comprehensive understanding on the legal and practical safety consequences for employers and platform workers. The methodology encompasses various stages, including participant selection, data collection procedures, instrumentation, and data analysis techniques, all of which were carefully chosen to ensure the rigor, reliability, and validity of the findings.

Participants

The participants comprised of nine individuals who all (at the time of data collection) work as specialised lawyers, university experts, labour union professionals, representatives of the Dutch and European governments regarding social affairs and labour law, the Dutch labour inspection and representatives of (branch-) employers organisations (i.e. platform companies). A purposive sampling method was employed to recruit participants meeting these criteria, ensuring a wide range of perspectives and experiences related to the research topic. Recruitment efforts included outreach through email, with an emphasis on inclusivity and diversity. Potential participants were provided with detailed information about the study's objectives, procedures, and confidentiality protocols prior to their voluntary participation. Informed consent was obtained from each participant before their inclusion in the study, reaffirming their understanding of their rights, the study's purpose, and the use of collected data in accordance with ethical guidelines outlined by the DPIA Ethical Committee.

Materials

The primary measures for data collection involved eight semi-structured interviews conducted with participants. These interviews were enlisted to test our findings on the legal and practical safety consequences of algorithmic management on employers and platform workers.

An interview protocol consisting of semi-structured interview questions and themes based on the topic of interest was used for the guidance of these interviews. Previous interview protocols made by partners were also utilised so cross-country and temporal comparisons could be accounted for. Ethical considerations were paramount in the selection and utilisation of

materials, with careful attention paid to safeguarding participant confidentiality and privacy throughout the data collection process.

Procedure

The procedure encompassed a meticulously planned approach to ensure systematic data collection, robust research design, and rigorous analysis. Data collection methods predominantly comprised semi-structured interviews conducted in-person, allowing for in-depth exploration of participants' perspectives and experiences related to legal and practical safety consequences of algorithmic management. The interviews were voice recorded either by using a regular audio recording device or the Microsoft Teams recording option after approval by the participants. The research design adopted for this chapter was qualitative, aiming to elucidate the multifaceted dimensions and complexities inherent in the phenomenon under investigation.

Data processing and diagnostics were integral to maintaining data integrity and quality. Upon collection, the data underwent examination to identify and address potential outliers or discrepancies. Regarding the data analysis strategy, a thematic analysis approach was utilised to identify, analyse, and report emerging patterns and themes from the interview transcripts. This involved a recursive process of familiarisation, coding, theme development, and revision, ensuring a comprehensive exploration of the qualitative data.
Throughout the procedure, strict adherence to ethical guidelines was maintained, ensuring participant confidentiality, voluntary participation, and informed consent. The entire process aimed to uphold the highest standards of research integrity and methodological rigor to warrant the credibility and trustworthiness of the study's outcomes.

RESULTS

The analysis of the eight interviews revealed prominent themes that encapsulate the participants perspectives on the interaction between AM and their OSH. Two main themes emerged; safety domains within laws relating to platform work, and the regulatory mechanisms for platform work. Within these two themes, several subthemes were constructed. The results from the semi-structured interviews will be discussed per subtheme.

A. Safety domains within laws relating to platform work

1) Current legal landscape for platform work

From the interviews, several Dutch laws were identified as relevant to platform work. These include the General Data Protection Regulation (GDPR), labour laws (see section 1c), and competition laws.

The competition law aims to protect fair competition by prohibiting, among other things, price-fixing and market division. Its relevance to platform work lies primarily in the potential negative consequences of market division that platforms can create. One interviewee explained it as follows: "When independent contractors work through a platform, they form a group of united 'entrepreneurs,' which can be detrimental to the 'entrepreneurs' who do not work through that platform. The crux of the matter is that if a platform company sets prices through the platform, it constitutes price-fixing. If independent contractors then use this platform, it is an agreement between two entrepreneurs." According to the interviewee, the question remains to what extent this conflicts with current legislation.

A significant issue in platform work is the distinction between employees and self-employed platform workers. In the current situation, these two groups, among other constructions, perform the same tasks. The draft of the *Clarification of Employment Relationships and Presumption of Employment Act* (Verduidelijking Beoordeling Arbeidsrelaties en Rechtsvermoeden; VBAR) seeks to clarify the relationship between platform workers and platforms to prevent pseudo-self-employment and to make enforcement more feasible. The draft bill introduces a so-called *'ABC formula*' to clarify the distinction between employees and independent contractors. According to one interviewee, this formula means that "if there are elements of embedding (which also becomes an indicator for working in the service of an employer) and instructions in the relationship, but it has also been shown that there is entrepreneurship, then it may be that a platform worker has A and B, but it is still not an employment contract when C is moreover present. Its legal presumption is related to Article 7:610aa of the Dutch Civil Code, which states that platform workers earning less than approximately thirty euros per hour are presumed to be employees, while above that amount, it is open to interpretation."

According to one interviewee Article 7:610 of the Dutch *Civil Code* concerning the employment contract: "Which has hardly changed since 1909. Nowadays, the authority criterion from this law is particularly problematic. It was previously assumed that someone in an employment contract does not bear economic risk for the result of their labour. Those who do bear this risk must therefore be able to influence the way the work is done and thus have authority over the employee. As a result, the authority criterion became the decisive criterion in the qualification of the employment contract. Due to the diversity of work today, this authority criterion is no longer always a clear indicator of who bears the economic risk for the result of the employee's work. Platforms break jobs down into tasks and outsource them. The authority has disappeared, while the collection of tasks still exists."

Lastly, there are ongoing collective actions, primarily focused on the labour law classification of platform workers. One of these actions – regarding *Uber Taxi* – resulted in a ruling by the *Amsterdam Court of Appeal*, which determined that Uber drivers should be classified as employees rather than independent contractors. This ruling aligns with the advice of the Attorney General to the *Dutch Supreme Court*, emphasising that the personal entrepreneurship of drivers is limited in determining their employment status. Consequently, *Uber Taxi* is required to comply with the collective labour agreement for taxi transportation, providing drivers with the rights and protections of employees [11]. According to interviewees, aside from the new *Platform Work Directive*, existing legislation is not yet fully utilised to provide protection to platform workers.

2) Anticipated reforms and implementation schedule for platform work regulations

In February 2024, an agreement was reached on the *Platform Work Directive*, which was subsequently adopted by the European Council in October 2024. The legislation is anticipated to come into effect in approximately two years. During this interim period, it is incumbent upon the various member states to determine the implementation strategies for the *Platform Work Directive*. The directive delineates several principles, yet much of its content comprises presumptions, thereby delegating the responsibility for detailed elaboration to the member states.

For all EU countries, the guiding principle will be what is stated in the *Platform Work Directive*. However, some countries, such as Belgium, France, and Spain, were already ahead in implementing legislation related to platform work. These countries may need to adjust existing regulations based on the version approved by the European Council if certain aspects are deemed incompatible. It is likely that no country will be exempt from making changes. Countries are allowed to go beyond the directive – thus providing more protection. This freedom exists because the current version of the *Platform Work Directive* largely delegates the responsibility for defining platform work to the member states. Whereas an earlier version of the directive used five elements to assess whether something is a platform, the definite version states that member states are obliged to determine the distinction between a platform with independent contractors and a platform as an employer. This implies an important role for national judges and governments in the classification of platform workers. Without these specific criteria, the uncertainty may return; judges may rule differently on platform work in each country. This means that member states can examine how the current directive aligns with existing labour laws and regulations.

It is anticipated that there will be a synergistic interaction between the *Artificial Intelligence* Act (AI Act; AI Regulation), the GDPR, and the *Platform Work Directive*. The AI Act primarily addresses the development of AI, rather than its application. It ensures that the fundamental rights of individuals are considered during the development of algorithms. Once algorithms are utilised by a platform, the *Platform Work Directive* becomes applicable. According to Article 9, paragraph 2 of the *Platform Work Directive*, no distinction is made between whether a platform company owns the algorithm or whether the software used by the platform is procured from a third party. This provision prevents platform companies from circumventing liability for any adverse consequences of algorithmic management. Once again, the exact implementation of this article is left to the individual member states. Therefore, the practical implications will depend on how national legislation incorporates these provisions.

Article 13 and 14 of the GDPR state that all data subjects have the right to know what data the platform collects about them during a workday, but it is essentially an obligation of the platform. Furthermore, in Article 22, the GDPR states that must be informed in advance about automated support related to decisions. The new *Platform Work Directive* further extends on this in Article 9, paragraphs 1a and 1b, stating that: "the information pertains to all details of decision-making and support by automated decision-making systems." Under privacy legislation, the platform itself is responsible and cannot refer to another party for this.

A significant aspect of the new directive is that member states must promote collective consultation within platform companies. These companies are required to establish a forum-like channel where employees can communicate with each other. This is intended to facilitate collective consultation among platform workers and align the structures of platform companies more closely with those of 'traditional' enterprises. The *Platform Work Directive* aims to enable platform workers to more easily advocate for better remuneration for their labour.

The Dutch Ministry of Social Affairs and Employment is currently engaged in a transposition process, examining which articles of the directive will be converted into Dutch law and whether this is necessary. The classification of employment relationships is a crucial component of the directive. This remains a complex discussion because it is a unique directive that encompasses both employees and independent contractors, whereas Dutch labour legislation applies only to employees. In this respect, the *Platform Work Directive* extends beyond labour legislation, creating a complex intersection. It is anticipated that there will be ongoing legal questions

regarding what falls under the directive. Conversely, it is expected that aspects of the *Platform Work Directive* may eventually apply more broadly to work in general, as algorithms are increasingly used in the workplace outside of platforms. Further national tightening based on the *Platform Work Directive* is a political choice. In the Netherlands, the likelihood of additional regulations for platform companies and algorithmic management does not seem imminent, according to some interviewees. The current cabinet has indicated that it does not wish to supplement EU regulations further. Some legal experts also suggest that there is no need for additional regulations, as the provisions regarding algorithmic management already appear to be quite comprehensive and robust. The practical issue, according to them, lies primarily in the application and enforcement of these provisions by platform companies.

3) Impact of Platform Work on Health, Safety, and Welfare Provisions in National Laws and Civil Codes

The impact of the *Platform Work Directive* on existing legislation can primarily be observed in relation to false self-employment. A portion of platform workers operate as independent contractors, exempting them from traditional labour laws and regulations. Consequently, many protections afforded to regular employees, such as those under employment contracts, working hours, and occupational health and safety laws, are not applicable to this group. This may lead to self-employed platform workers facing a higher risk of excessive working hours, insufficient rest periods, and unsafe working conditions if they fail to sufficiently monitor these aspects themselves.

The exclusion of independent contractors from traditional labour laws, such as the *Working Hours Act* and the *Occupational Health and Safety Act*, stems from the absence of an authority element between employer and employee. This element is absent in the case of independent contractors. This group is responsible for complying with safety and health regulations, but practical experience shows that work situations can arise where efficiency and speed are prioritised over safety and health. This can pose various risks. One interview provided the example of a courier under time pressure to make as many deliveries as possible, leading them to ignore traffic rules or take insufficient rest to meet this goal. This can potentially result in accidents.

Additionally, the duty of care of the employer, as stipulated in Article 611 of the *Civil Code* ("the employer and the employee are obliged to behave as a good employer and a good employee"), does not apply to independent contractors working through a platform. These gaps in the protection of workers should be covered by civil insurance, but in practice, such insurance is often not taken out. This is because the employment is often accidental, making the hefty insurance premiums required of the self-employed prohibitively burdensome for this group.

Furthermore, it is challenging to monitor how much a self-employed platform worker actually works, complicating the enforcement of the Working Hours Act. This poses the risk that individuals may work sixty or eighty hours, for example, by working for three platforms simultaneously and for each one twenty hours per week. The responsibility for this lies with the independent contractor, not the (platform) company. The only form of control that can be exercised is over the number of different employers for whom an individual works. One of the interviews suggested a form of public registration as a solution to this issue.

4) HSE risks associated with meal delivery

In Appendix 2, the HSE risks are listed that were identified through desk research prior to the interviews. This list of risks was subsequently presented to the interviewees for verification and completeness. During the interviews, additional risks associated with platform work were identified. Platform workers face risks on public roads due to road safety issues. It is the employer's responsibility to ensure their safety. This includes exposure to aggressive road users, hazardous traffic situations (e.g., unclear intersections in urban areas, lack of separate lanes for cars and cyclists), and dangerous situations arising from the characteristics of the vehicle used. An example provided was an electric bicycle – a so-called fatbike – with delayed pedal momentum, preventing it from quickly accelerating at a busy intersection.

Age was also cited as a factor in unsafe road participation. Meal delivery workers are subject to age restrictions regarding working hours and the companies they may deliver for. Children under thirteen years old are prohibited from working altogether. For youths under eighteen, specific examples apply. The *Additional Regulation on Child Labour excludes* "independent and commercial delivery of meals or groceries by the child involving participation in traffic using a vehicle" (Article 1, paragraph 3, sub c) due to unacceptable safety risks for the child or their environment. However, these rules are sometimes violated, resulting in underage workers delivering meals at late hours. Working late at night can also pose risks for all platform workers due to the change in the type of customers they may encounter. Customer interactions later in the evening carry an increased risk of aggression and violence.

Interactions with colleagues can also contribute to platform workers perceiving their work environment as unsafe. One interviewee noted that where meal couriers gather, unpleasant work situations can arise: "when such a group of couriers waits together in a square for assignments, bullying can occur." Additionally, competition between drivers working for a platform and regular taxi drivers can cause tensions, as they compete with each other.

Street harassment in certain urban areas was also mentioned; i.e., unwanted remarks or behaviours such as insults, threats, and harassment in public or other open spaces. This prompted the interviewed platform company to stop sending couriers to these areas (at certain times) and to consult with the municipality to signal and seek solutions. Regarding the cognitive demands related to platform work, the speed of the work can contribute to psychological stress, with working under pressure increasing the likelihood of errors.

Although platform companies claim to control illegal employment by checking for valid residence documents and work permits under the Dutch Foreign Nationals Employment Act (*Wet vreemdelingen arbeid; Wav*), one interview questioned the effectiveness of this. It is economically disadvantageous for companies to conduct strict checks, making the control dependent on the quality and ethics of the employees performing these checks. This makes the system for preventing illegal employment vulnerable. Inspectors frequently report that illegal workers are using other people's platform accounts. Although the number of official findings is unknown, there are indications that people from abroad are entering platform companies through temporary jobs to generate income, making them vulnerable. For example, 'dark kitchens' – catering establishments on industrial estates solely focused on food delivery – complicate supervision because their exact locations are less clear. In April this year, the *Netherlands Labour Authority (NLA)* reported that employing migrant workers illegally provides financial benefits and that this often remains the case even if the employer is fined for such an

offence, with an average cost advantage of sixty percent [10]. It goes without saying that this can encourage malpractices by companies pushing the boundaries of what is permissible.

In addition to the threat of dismissal by an algorithm without adequate explanation, the so-called '*ghosting*' is a risk for platform workers who work as freelancers and are paid per task. In ghosting, workers are not formally dismissed but simply receive no more assignments from the platform. In other words, if workers do not meet the algorithm's expectations, they automatically receive fewer assignments in the case of *ghosting*.

5) Implications for platform companies employing workers

The *Platform Work Directive* is expected to result in stricter regulations for platform companies, including obligations to provide greater transparency regarding algorithmic management and the working conditions of platform workers. The directive may influence the classification of workers, leading to more platform workers being considered employees rather than self-employed, with all the associated rights and obligations. The general trend appears to be that platform workers will become employees – or at least that the distinction between platform workers who are employees and those who are self-employed will become less pronounced. However, this introduces legal complexities.

B. Regulatory mechanisms for platform work

1) Necessary of additional regulatory mechanisms to monitor digital platforms

There is currently considerable uncertainty regarding the precise implementation of monitoring on platforms. Within the *NLA*, there is ongoing deliberation about the use of algorithms, particularly within its own data lab. The current discussion primarily focuses on how algorithms can be employed for risk selection, but there is limited attention to the oversight of algorithms. Although the *NLA* acknowledges the risks associated with algorithms (in platform work), there is no clear answer on how to address these issues.

If algorithms become an integral part of every inspection, there is a recognised need for a specific regulator for the algorithms used by platform companies. In this scenario, the *NLA* would primarily have a signalling function regarding where and how algorithms are deployed within a company. An independent authority would then oversee the use of algorithms and their impact on workers. This authority should have full access to the systems of platform companies and establish specific rules and guidelines for the use of such algorithms. However, it remains uncertain, according to some interviewees, whether platform companies will provide insight into the functioning of their algorithms, given the experiences in legal cases in the Netherlands with several large international meal delivery companies. Typically, snippets of data from IT systems are provided regarding which aspects of platform workers' performance are monitored, but no insight is given into the algorithm's functioning. Understandably, this is because the algorithm constitutes the core of the business model and competitive advantage. Additionally, it is questionable whether a local platform company operating in an EU member state can provide such insight at the national level, as this information is only known at the headquarters of the internationally operating company. Furthermore, one interviewee from a platform company that employs couriers indicated that the presumed sophistication of the platform algorithms is overestimated; only the GPS location and the number of deliveries per hour are recorded. The complexity of the algorithms depends on the operational methods and other variables within the platform.

In the area of occupational safety, there is already extensive regulation, but it is not fully utilised. According to one interviewee, the problem lies primarily in labour law oversight, which is inadequate: "The Labour Inspectorate and the Dutch Data Protection Authority (*Autoriteit Persoonsgegevens, AP*) do not have enough personnel to conduct adequate oversight. They now focus too much on data, rather than maintaining direct contact with companies. The reins have been too slack for too long." This creates the risk that it will also be challenging to maintain effective control over platform companies with the new Platform Work Directive. This issue is not only relevant to this directive but also to other European platform and AI-related directives.

Moreover, there could be a significant role for the private sector, such as trade unions. These organisations need to become proficient in platform work legislation and enforce it more through private law. Trade unions can relatively easily ask platform workers (who are members) for their time records, for example. By collecting this information from larger groups of platform workers, they can gain a clear picture of what is actually happening at platform companies, particularly regarding working hours. Additionally, it is very difficult for individual platform workers to prove discrimination. A trade union can broaden this issue and inquire how it affects other platform workers. Platform workers should have a say in decisions that affect their work and working conditions, similar to the rights of employees in traditional companies. Furthermore, Article 21(2) of the *Platform Work Directive* stipulates that national courts can require digital labour platforms to provide relevant evidence, which, according to one interviewee, also means that a judge can demand full access to an algorithm.

In terms of privacy legislation, it is estimated that much is already covered by the *GDPR*, but the *Platform Work Directive* further specifies it in the context of platform work to eliminate potential disputes. In this sense, enforcement changes little. If, aside from the directive, more accidents occur in practice, enforcement on such platform companies may be intensified based on risk profiles from the *NLA*.

2) Role for governmental 'algorithm watchdogs'

Trade unions could play a pivotal role in driving the oversight of platform companies, after which the *NLA* and the *AP* could primarily assume this role. Algorithmic management concerning personal data falls under the responsibility of the data authority, as this data is used to shape working conditions. The directive provides opportunities for agencies to exercise oversight, but trade unions, for example, could be involved in recognising patterns based on aggregated data. These anonymised data sets could serve as support in legal proceedings.

In their current form, the *AP* and the *NLA* lack sufficient resources to conduct effective oversight, according to some interviewees. Although the *AP* can impose substantial fines, these are too low to make an impact on some platform companies and are already factored in by their headquarters. This creates the risk that these agencies become 'paper tigers' in enforcement, as there is insufficient time and resources to curb improper algorithm use through binding decisions. This is a significant risk that must be avoided in the implementation of the *Platform Work Directive*. The precise roles that the *AP* and the *NLA* can and will assume remain unclear, according to interviewees, but "ideally, a collaboration between these agencies will emerge."

3) Platform companies' role regarding the provision of information

Platform companies have a role regarding the provision of information to those who request it. Article 9 of the *Platform Work Directive* stipulates that platforms must always provide information about automated decision-making systems when requested by a platform worker or their representative: "Platform companies have the provision to provide information to employees who ask for it." Additionally, there are already transparency obligations under the *GDPR*; Articles 13, paragraph 2, sub F, and 14, paragraph 2, sub G state that the data controller – in this case, a platform – must provide the data subjects with additional information about the existence of automated decision-making, including profiling. This means that platforms must explain how the algorithms allocate tasks. Currently, platforms provide some information, but not at the level of detail required by the *GDPR*, according to an interviewee.

The *Platform Work Directive* goes even further. Platforms are not yet compliant with this directive. Additionally, under GDPR Article 15, paragraph 1, sub H, a platform worker can also make an access request. This is supplemented by Article 9 of the *Platform Work Directive* and the provisions in the *AI Act*, creating a patchwork of overlapping regulatory frameworks. Furthermore, platform workers must be informed of any changes to the algorithm that affect their performance as platform workers. According to Article 23 of the directive, taking legal action to demand which data is used about them in the algorithm cannot be grounds for dismissal.

In the context of the *GDPR*, consent is a crucial turning point. When consent is given and there is no authority relationship, all data can be processed. In an employment contract, it is not possible to give this consent because there is no free relationship between the parties. An employment contract requires a legal basis for data processing. Processing personal data is generally not permitted. Outside this employment relationship, it is a different matter.

4) Platform transparency regarding algorithmic management

According to the *AI Act*, platform companies remain responsible for the algorithms they use. The entity that built the algorithm is ultimately accountable for its design. Many large platforms have developed their own algorithms, which also provides a significant competitive advantage. Conversely, it is not possible to evade responsibility: the entity deploying an algorithm is accountable for it.

Furthermore, agencies such as the *NLA* can, under Article 17(1) of the *Platform Work Directive*, access data on (a) the number of platform workers, broken down by activity level and their contractual or employment status, (b) the general terms and conditions established by the platform and applicable to these contractual relationships, (c) the average duration of activity, the average number of hours worked per week per person, and the average income of platform workers who regularly work through the platform, and (d) the intermediaries with whom the platform has a contractual relationship. This is evident from a closer inspection of Article 17 of the directive, following a statement made by an interviewee regarding this article.

In practice, enforcers must determine what they want to monitor based on the risks posed by the algorithms. The precise method of this monitoring remains unclear. One expert interviewed believes that the responsibility should be placed on the algorithm's developer from the outset. It must be proven that everything is legally compliant, as post-hoc verification is an impossible

task. This means that legislation must be developed in such a way that it is clear to algorithm developers how to build within the legal boundaries.

The *Platform Work Directive* requires platform companies to explain how their algorithms work and their consequences, but the challenge remains that self-learning algorithms are often opaque. Transparency and oversight are essential to comply with the new legislation and to prevent future discrimination. Fundamental changes are needed in the explanation of the algorithms used by platform companies. Many current systems are very sophisticated, while the organisations using them often can no longer explain what makes the algorithms so intelligent.

Furthermore, the *Platform Work Directive* can ensure that the use of both monitoring and decision-making algorithms will become more transparent. Platforms are now required to concisely and understandably explain what they do and how the underlying algorithms work. In enforcing the application of algorithms by platform companies, it is expected that cases involving multiple platform workers will be considered simultaneously. It is difficult to prove discrimination in individual cases. Context will be crucial here. A slower cyclist should not receive less work based on the Equal Treatment Act on the grounds of disability or chronic illness. Conversely, a reckless driver would not be able to take legal action. However, if it is found that a specific group receives fewer assignments due to their group characteristics, this constitutes prohibited discrimination, and the algorithm may no longer be applied in such a manner. This could mean a change for workers who are paid per task (e.g., per delivery or ride).

5) Platform worker awareness regarding algorithmic management

The interviews revealed that platform workers are currently insufficiently informed about algorithmic management. The information provided to employees is often general and vague. There is a lack of detailed explanation regarding how an algorithm functions and what data is used. The new legislation is expected to provide guidelines on how this can be substantiated in concrete language, but it will not specifically define when adequate information provision is achieved.

6) Human supervision of algorithmic management

In the current situation, platform workers can be dismissed or receive no further assignments (*ghosting*) due to automated decisions made by an algorithm. This often leads to significant situations where individuals suddenly lose their entire income. Some platform companies have already implemented structures where important decisions (e.g., performance decisions or dismissals) always involve a human.

The new *Platform Work Directive* addresses this in Article 10, paragraph 5, which states that there must be human involvement in automated decision-making. It is assumed that this will be provided to the representatives of platform workers. This involvement cannot merely be 'rubber stamping'; someone must effectively make the decision based on what the algorithm provides. Additionally, employees should not face negative consequences if they challenge a decision made by the platform company – for example, regarding a dismissal.

There must be meaningful human intervention in automated decision-making, but it is unclear who qualifies as personnel to communicate a decision to platform workers. The *Amsterdam*

Court of Appeal has indicated that platform companies have a heightened duty to demonstrate that meaningful human intervention has occurred [11]. This means that the person must be able to identify a “false positive” and have access to both the data that formed the basis of the decision and other relevant data.

This could indeed be a manager who has sufficient knowledge of how the algorithm works. This implies that platform companies need to employ more human managers; many organisations currently lack them. It requires a change in the organisational structure, with two key points. First, there must always be a human point of contact, and second, for important decisions impacting good working conditions, there must always be a person who can override decisions made by algorithms. This could take the form of delivery hubs where employees can regularly go for questions and explanations of decisions during a workday.

7) Prohibited processing of personal data related to algorithmic management

Any basis for discrimination is prohibited. This includes factors such as origin, ethnicity, biometric data, sexual or political preferences. Additionally, the *AI Act* defines certain prohibited systems and high-risk systems. Examples of prohibited systems include: “unacceptable risk, social scoring, real-time remote biometric identification, biometric categorisation, individual predictive policing, emotion recognition, and untargeted scraping” [12].

Furthermore, it is forbidden to process personal data related to the emotional or psychological state of individuals, private conversations, and data collected when someone is not working. It is also prohibited to process personal data to make predictions about the exercise of fundamental rights, such as the right to association.

CONCLUSION

A. Legal

The current legal framework for platform work in the Netherlands is marked by a complex interplay of various laws, including the GDPR, labour law, and competition law. While these laws aim to ensure fair competition, prevent false self-employment, and protect platform workers' rights, their effectiveness is hindered by the rapid evolution of platform work and enforcement challenges.

The *Platform Work Directive*, adopted by the European Council in October 2024, provides a foundational regulatory framework for platform work across the EU, yet allows significant room for national interpretation. This directive aims to harmonise with existing laws such as the *AI Act* and the *GDPR*, emphasising transparency and collective consultation within platform companies. However, the impact of this directive will largely depend on how each member state integrates it into their national legislation. This implementation process is currently under review in the member states, including the Netherlands.

B. Viewpoints

A current problem regarding platform is the ‘qualification problem’ [13], which implicates that platform workers working as independent contractors often fall outside the traditional legal labour protections, exposing them to risks such as excessive working hours and unsafe conditions. It is important to note here that there is a trend among food delivery platforms in the

Netherlands to employ the workers, through an employment agency or otherwise. Taxi platforms continue to work with freelance drivers for the time being. The responsibility for compliance with safety and health regulations lies with the self-employed, which can lead to prioritising efficiency over safety. The lack of employer duty of care and the high cost of civil insurance further exacerbate these risks. Effective monitoring of working hours remains a challenge, suggesting the need for solutions like public registration of work hours.

Furthermore, platform workers currently lack adequate unification and collective representation. Internationally, there are examples of 'grassroots' unions, such as the *Worker Info Exchange* (WIE) [14] in the United Kingdom and (formerly) the *Driver's Seat Cooperative* [15] in the United States, where platform workers are pooling their data to create analytics that can be used to help workers make better informed decisions or as evidence in lawsuits against platforms.

Furthermore, to address this lack of adequate representation and the 'qualification problem', Van Slooten and Holscher [13] proposed the establishment of workers' cooperatives as a viable solution. These cooperatives would allow platform workers to unite under a single entity, enabling them to negotiate better working conditions collectively. By pooling resources, worker cooperatives could collectively agree on the terms and conditions under which the workers perform the assignment, act as a co-determination body for the workers in relation to the platform, and purchase products and/or insurance for the purpose of performing the work.

The *Platform Work Directive* is expected to lead to stricter regulations for platform companies, enhancing transparency in algorithmic management and working conditions. It may result in more platform workers being classified as employees, introducing legal complexities given the EU's limited powers in labour law. The Dutch government is likely to focus on raising awareness among platform workers about their contract choices. The successful implementation of the directive within the next two years will be crucial for all stakeholders involved.

The general trend seems to be that platform workers are becoming employees – or at least that the distinction between platform workers who are employees and independent contractors is becoming smaller (leaving aside the ruling regarding the platform company Temper, which raises the question of what legal precedent this sets for other lawsuits concerning platform work [4b]). In the food delivery sector, this trend is already visible. *JustEat Takeaway* employs its own couriers, who are responsible for delivering approximately twenty percent of the orders sold through the platform. *Deliveroo* already left the Netherlands in 2022 [16], and *UberEats* has announced that it will fully transition to the agency model in early 2025, using external employment agencies to take on the role of employer [17].

Some platform companies have already implemented structures where human involvement is required for critical decisions, such as performance evaluations or dismissals. The new *Platform Work Directive* mandates human oversight in automated decision-making processes, ensuring that decisions are not merely rubber-stamped but meaningfully reviewed by qualified personnel. This could, for instance, take the form of delivery hubs where employees can regularly visit during a working day to ask questions and (explain) decisions. With international platforms, the question is also whether there should be someone in the country itself who can provide explanations, or whether this is only done at headquarters. This necessitates a shift in organisational structures, requiring more human managers who understand the algorithms and can override them when necessary. Ensuring a human point of contact and oversight for significant decisions impacting working conditions is crucial to comply with the new regulations.

The current state of monitoring digital platforms reveals significant gaps and uncertainties. There is current insufficient knowledge and focus within the NLA to be able to oversee the complexities of these algorithms. Existing labour safety regulations are underutilised, and enforcement is hampered by resource constraints and legal power for effective enforcement within the *NLA* and the *AP*. This inadequacy in oversight could persist even with the new *Platform Work Directive*. This suggests that trade unions could play a crucial role in monitoring and enforcing compliance by gathering data from platform workers and advocating for their rights. The *Platform Work Directive* empowers national courts to compel digital platforms to provide relevant evidence, potentially including full algorithmic transparency. Even so, judicial disputes can be protracted, often spanning several years. This underscores the urgent need for digital enforcement mechanisms. One potential solution is the implementation of APIs to interface directly with platforms, facilitating real-time data access and enabling swifter regulatory interventions.

Platform companies will be required by law to provide comprehensive information about their automated decision-making systems to platform workers. Despite existing transparency obligations, platforms currently do not fully comply with these requirements, in part because of the complexity of overlapping regulatory frameworks. Enforcement on compliance thus remain a challenge. However, the responsibility to prove that an algorithm will not exhibit any (accidental) malicious intent will rest with both with the developers and users of the algorithms. In other words, the *Platform Work Directive* requires platforms to be transparent about the functioning and implications of their algorithms despite any opacity of self-learning algorithms that might exist according to the platform company. Although this supposed complexity of the algorithms in use in practice was downplayed by during the interviews by one interviewee. Nonetheless, necessitates the complexity that may indeed exist fundamental changes in the explanation of the algorithms used by platform companies.

Currently, platform workers seem to be insufficiently informed about algorithmic management. The information provided is often argued to be general and vague, and lacking detailed explanations of how algorithms work and which data is being used by the platform company. The *Platform Work Directive* is expected to provide more clarity and concrete guidelines for adequate information provision and what may and may not be registered, but it remains challenging to determine when these information requirements are fully met.
A limitation of the viewpoint section of this article is that the distinction between employees of platform companies and freelance workers for a platform was occasionally blurry for the experts we interviewed – even though this distinction has implications, particularly regarding the risks the workers are exposed to in their work. For example, freelance platform workers will have more freedom regarding the equipment they use. This poses additional risks, as there may be less control over whether workers are using adequate equipment.

On the other hand, these risks are mitigated as independent contractors are required to comply with several general regulations of the *Dutch Working Conditions Act* to ensure their safety and health in the workplace, and of others. They are required to prevent danger to third parties (Article 10). Additionally, they must ensure their own safety and that of other involved persons by behaving safely and responsibly, in accordance with Article 11 of the act. Lastly, they should avoid life-threatening situations or serious health damage is crucial, as non-compliance with this provision is considered a criminal offense under Article 32 of the Working Conditions Act.

C. Summary of conclusions

To conclude, the European initiative to establish legal rules regarding the qualification of the employment relationship of platform employees seems to be successful. However, the interpretation and implementation of these laws will largely depend on the individual European member states, and the specific approaches they will adopt are yet to be determined. The existing distinction between employees of platform companies and independent contractors working via these platforms is anticipated to undergo significant changes. In the context of monitoring platforms, trade unions could play a pivotal role on the private law side helping platform workers to collective strive for more transparency and fair labour conditions. Concurrently, governmental oversight of platforms and their algorithmic management could be significantly influenced by labour inspection and data protection authorities. However, it remains uncertain how the Platform Work Directive will be implemented in Dutch law, and whether these regulatory organisations possess the necessary regulatory capacity and authority to effectively fulfil their roles in overseeing compliance.

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Appendix 1: Possible risk factors related to delivery work

1. Unsafe traffic participation and material conditions such as:
   a. (Repeated) traffic violations such as riding on the sidewalk, not wearing a helmet or wearing it improperly, and running red lights.
   b. Failing to meet safety and maintenance requirements for the vehicle (e.g., e-bike, cargo bike, or scooter) due to deferred maintenance to reduce service costs.
   c. Use of substandard repair tools and equipment.
   d. Unsafe road and weather conditions.
   e. Unsafe working conditions:
2. Working under time pressure.
   a. High workload.
   b. Late working hours.
   c. Ergonomic risks associated with operating a vehicle or handling packages.
   d. Overloading the worker with heavy loads on their back (e.g., backpack or containers for deliveries).
   e. Excessively long and late working hours or night work (violations of the Working Hours Act) or working at unauthorized hours (due to age).
3. Inadequate information, training, and supervision by the platform company, lack of infrastructure to train employees and provide professional development.
4. Impact of technology and algorithms on safety:
   a. Encouraged by the algorithm to drive faster and take more risks.
   b. Unpaid labour (waiting time in restaurants, waiting time between gigs).
5. Unsafe conditions at store and storage locations:
   a. Heavy objects at height that can easily fall on workers.
   b. Aisles that are too narrow.
   c. Blocked emergency exits.
   d. Not being well-informed on how to act in emergencies.
   e. Inadequate work equipment (such as mobile platform ladders with handrails and brake protection)
   f. Distribution locations that are dirty and cramped, lacking waiting or break areas.
6. Performance demands such as emotional labour, high work intensity (working at high speed or with tight deadlines), extensive hours (long workdays or weekly hours), and competition among workers.
7. Cognitive demands due to significant amounts of unpaid work associated with platform work, such as waiting for or finding relevant tasks, searching for suitable tasks, taking qualification tests, reading reviews from applicants/customers, ensuring correct payment calculations, and administrative work as a freelancer.
8. Limits on the autonomy of platform workers: penalties related to refusing too many orders, not logging in at certain times or within specific work zones, or cancelling scheduled shifts.
9. Lack of social opportunities with supervisors and colleagues. Internal ranking mechanisms that pit workers against each other and the lack of face-to-face interaction hinder the formation of peer support and reduce opportunities to consult others on work-related issues.
10. Underpayment and undeclared work (inaccurate payroll, unclear who is on the payroll and working); financial stress.
11. Illegal employment, workers without a permit to work (such as foreign students and labour migrants) but able to work through someone else’s account.
12. COVID risks such as close contact or working with infected colleagues and customers.

13. Challenges related to customer interactions, such as handling monetary transactions; risk of being robbed.
14. Violation of hygiene rules.
15. Threat of dismissal (automated by the algorithm or by a platform company representative).

3 Labour Laws on Platform Workers in Spain

Labour Laws on the Employment Relationship and Platform Workers in Spain

José-Javier Larrañeta & Yolanda García Martínez

Abstract — This article describes the relevant legislation concerning digital platform work and OSH (Occupational Safety and Health) regulations in Spain. These include the national Law on Delivery workers (riders) at digital platforms approved in 2021 that has been the basis of the just approved EU Directive. Riders' law includes a tacit presumption of employment for those delivery platform workers, considered autonomous workers until. Since then, companies that operates Digital Platforms with delivery workers in Spain had to change the employment relationship with them and assume all obligations related to the Prevention Law. This means that the Business companies with platform workers must fully ensure OSH for all (managing all risks at work of the "new" employees). Platform work and algorithmics carries additional risks to platform workers, mainly related to Psychosocial and mobility, that are described in the paper. Women in digital platforms and gender perspective in the risk assessment is also commented in detail.

Keywords — Platform Work, Spanish Labour regulations, European Directives, Algorithmic Management, Occupational Safety and Health

INTRODUCTION

Our society has changed in terms of consumer habits linked to the new forms of technology and digital businesses. This has led to a greater system of consumption and acquisition of goods online through digital platforms, that use algorithms, and has promoted new work models to deliver the products through these platforms. These delivery workers can use different means of transportation such as vans, motorbikes, bicycles, scooters, etc. or even walk, following instructions on the smartphone sent by digital platforms. So platform workers are exposed to more mobility risks, that are added to the general risks due to the delivery activity (handling of weight loads, ergonomics) and mainly to other specific risks related to the use of such digital platforms and how algorithms organize and control the tasks from the platforms (irregular and longer working times, stress and other health problems). This is an example of platform work, also called the ´gig economy´ as a new form of employment that carries new challenges in the employment relationship and in the occupational safety and health of such workers.

This study analyses the employment situation in Spain of digital platform workers, through the social and jurisprudential perspective of the rights of these workers, that derivate in the main regulation compiled in the National law 12/2021 of September 28, and the practical consequences of its application in Spain, both in the employment relationships and the OSH practice. Also how the recent European directive 2024/2831 of October 23, 2024 affects these regulations. Likewise, a mention is made of some of the penal consequences for some digital platform companies that did not comply with such norms.
On the other hand, the occupational risks of these workers and the applicable regulations are analysed. This analysis includes digital platform workers and specifically food delivery workers (known in Spain as “riders”), and how the new European directive 2024/2831 of October 23, 2024, promotes the improvement of the working conditions in platform work, added to the advances already forced by the national regulations. The European directive was published on November 11, 2024 in the OJEU, although member states have a period of 2 years, until December 1, 2026, to adapt their regulations to it. In the case of Spain main objectives were already reached.

According to statistics the European Commission evaluated in 2022 the number of digital platform workers around 28.3 million (comparable to the 29 million workers in the manufacturing sector), and with significant growth (+52%) figures estimate 43 million platform workers by 2025. Of such number of platform workers 24% would be related to delivery work (food, moving).
A peculiarity of these platform workers is in general their youth and the over-qualification for many of these jobs, that are predominantly male and with a significant percentage of immigrants, which entails the need to consider also the perspective of gender, age and race. We include in this report some references to all these aspects.

BACKGROUND AND CURRENT LEGISLATION

Spain is one of the countries with the highest level of judicialization about the classification conflict over employment on digital platforms. Prior to Law 12/21 of September 28, dozens of rulings were issued resolving the claims of workers who were considered false self-employed workers.

Most of these rulings resolved in favour of the workers and recognized the labour nature of their contracts; although some rulings continued to maintain that they were true self-employed workers. This contradiction in judicial doctrine has allowed, and at the same time has forced, the Spanish Supreme Court to rule to unify the doctrine.

The Spanish Supreme Court issued its first ruling to unify the doctrine on September 25, 2020 (rec. 4746/2019); issued by the Plenary Session of the Supreme Court on social matters, adopting the decision unanimously among all the magistrates and the employment relationship is recognized to these workers. (1)

This ruling was the trigger for the establishment of a Social Dialogue table on October 28, 2020, composed of the different social agents (unions and entrepreneurs) and the Ministry of Labour that promoted the Law 12/21 of September 28, 2021, called riders´ law, which modifies the consolidated text of the Workers' Statute, approved by Royal Legislative Decree 2/2015, of October 23, to guarantee the employment rights of delivery workers in digital platforms (2). This norm that emerged from the consensus of all social agents and the government of Spain and this relevance is mentioned as the preamble of the law:

“This Law, therefore, is the result of the Agreement adopted, on March 10, 2021, between the Government, CC. OO., UGT, CEOE and CEPYME, after the work carried out by the Social Dialogue Table established, for this purpose, on October 28, 2020.”
The Law has a unique article and two final provisions, whose purpose is the precision of the right to information of the representation of workers in the digitalized work environment, as well as the regulation of the employment relationship as an employee in the delivery digital platforms business sector.

The single article modifies the consolidated text of the Workers' Statute Law, approved by Royal Legislative Decree 2/2015, of October 23, in two aspects. Firstly, it modifies article 64, relating to the rights of information and consultation of the legal representation of workers, adding a new paragraph d) to section 4, which recognizes the right of the works council to be informed by the company about the parameters, rules and instructions on which the algorithms or artificial intelligence systems that affect decision-making are based, systems that may affect working conditions, access and maintenance of employment, including the creation of personal profiles. And secondly, it introduces a new additional provision on the presumption of employment relationship of the delivery or distribution activities, of any type of product or merchandise, when the company exercises its powers of organization, direction and control, through the algorithmic management of the service or working conditions, through a digital platform. This presumption does not affect the provisions of article 1.3 of the Workers' Statute.

This presumption of employment is very relevant, so now the company must allege and prove formally the lack of employment relationship against such presumption.
Although, in Spain, most companies adapted their employment contracting policy to the new regulations, affiliating their workers and changing the contract system from self-employed to employed worker, there has been a case in Spain that refused to follow the norm. Glovo delivery platform company has systematically refused to comply with the new law, (allegedly) violating the right of delivery workers.

Glovo's attitude of non-compliance has remained firm during these 3 years and this despite the fact that:
- Numerous legal claims have been filed against this company.
- It has been sanctioned repeatedly by the labour inspection with a high cost in sanctions and fines.

Glovo has not stopped its attitude until November 28, 2024, just one day before its CEO, Oscar Pierre, had to testify in Barcelona accused of a crime against workers' rights. This is the first time that a criminal case has been initiated against the company, although it has a long history of fines on which the Supreme Court has yet to rule.

On the other hand, a competitor, Just Eat that complies with the Spanish law, has filed a lawsuit in the Commercial Courts of Barcelona in which they accuse Glovo of unfair competition for violating rules and hiring false self-employed workers, with a claim of 295 million euros in damages. (3)

Spanish law has been pioneer with respect to the existing legislation in other member states of the European Union, and the inspiration and legal source for the drafting of European directive 2024/2831. (4)

1. Employment status (legal presumption that all workers are employees, article 5.

The new rules will address cases of misclassification of platform workers and ease the way for such workers to be reclassified as employees, guaranteeing easier access to their rights as employees under EU law. The Directive introduces an effective, rebuttable legal presumption. According to this agreement, the relationship between a digital labour platform and a person performing platform work shall be legally presumed to be an employment relationship when facts indicating control and direction, according to national law, collective agreements or practice in force in the member states are found.

If the digital platform wants to rebut this presumption, it must prove that the contractual relationship in question is not an employment relationship. It is up the member states to set out the modalities of such a legal presumption in their national law. The presumption should make it easier from a procedural perspective for platform workers to legally ascertain their employment status.

The European Directive prevents the retroactivity of the norm; thus, paragraph 6 of said article states that the employment relationship will be considered only from December 2, 2026, the deadline for member states to transfer this regulation to their legal system.

This presumption of employment relationship was already included in Spain by Law 12/2021 of September 28, meanwhile this presumption not included in all the regulations of the EU member states and will have to be added to their legislations.

2. Introduction of the first EU rules on algorithmic management and the use of artificial intelligence in the workplace.

Digital labour platforms use algorithms for human resources management. These systems are used to organise and manage the people performing platform work through their applications or websites. Under the new rules, workers will have to be informed about the use of automated monitoring and decision-making systems. Also, digital labour platforms will not be able to process certain kinds of personal data, such as:

- personal data on the emotional or psychological state of platform workers
- data related to private conversations
- data to predict actual or potential trade union activity
- data used to infer a worker’s racial or ethnic origin, migration status, political opinions, religious beliefs or health status
- biometric data, other than data used for authentication.

In any case, under the new rules, these systems need to be monitored by qualified staff, who enjoy special protection from adverse treatment. Human oversight is also guaranteed for significant decisions such as the suspension of accounts. It also includes the obligation to carry out the algorithmic audit every 2 years, which is not contemplated in the current law, and to extend the algorithmic transparency obligations, which are now more limited.

This European regulation on the protection of personal data of Platform workers reinforces another existing regulation, the General Data Protection Regulation (GDPR), Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data). (5)

Since these algorithms use Artificial Intelligence techniques, Digital Platforms must also take into account the new European Directive on Artificial Intelligence (Artificial Intelligence Act, (EU) 2024/1689 of the European Parliament and of the Council, of June 13, 2024) (6).

The new European Directive represents a turning point for digital platform workers in Europe.

OCCUPATIONAL SAFETY AND HEALTH REGULATIONS IN SPAIN

In Spain, the norm that regulates occupational health and safety is Law 31/1995, of November 8, on the Prevention of Occupational Risks (7). The employer has the duty to protect their workers against occupational risks, guaranteeing their health and safety in all aspects related to their work, by integrating preventive activity in the company and adopting whatever measures are necessary.

Neither European nor Spanish legislation on delivery workers contemplates occupational risk prevention regulations that include the specific risks that these workers may suffer. The Spanish Occupational Risk Prevention Law has not been modified in this sense either, although as announced by the Spanish Ministry of Labor, an update of this Law is planned for 2025.

Although the Spanish OSH law 31/95 establishes in its article 16 the need to carry out a Risk Assessment, in companies of any productive sector or number of workers, it does not include the obligation to carry out the Psychosocial Risk Assessment. In 2012, the Labour Inspection published its ITSS Action Guide on Psychosocial Risks (8) to promote the implementation of a specific risk assessment on psychosocial factors in organizations so that “root causes” were identified and prevention measures will be implemented rather than protection.

Later in 2021, the Technical Criterion 104/2021 of the Labour Inspection is published, where the legal obligation to carry out Psychosocial Risk Assessments in all companies and practical recommendations for compliance are reiterated. (9)
These regulations and guidelines must be considered and applied by digital platforms in Spain.

In relation to the **Teleworking** activity, work model enhanced by the covid pandemic, Spain approved a Law on remote work for company teleworkers and also for digital platform workers. This law 10/2021, of July 9, in its article 16, includes in detail the risk assessment and planning of preventive activity for this type of remote work. (10)
This rule will apply to workers of companies that operate digital platforms that use the teleworking modality, but not to their delivery workers.

Recommendations on occupational health and safety by the European and Spanish Agencies
Although not included in the legislation, the OSH Institutes in Spain, both the National Institute (INSST) and the regional at the Basque Country (OSALAN), have developed different studies on occupational risks of digital platform workers and also on psychosocial risk factors, as the main emerging risk, with special impact on delivery workers. (11) (12) (13) (14)

On the other hand, the European Agency for Safety and Health at Work, EU-OSHA, has been publishing different studies and recommendations on the occupational risks of digital platform workers, challenges and actions to improve prevention, safety and health (15) (16). All of them are related to the official OSH Framework Directive. This information and documentation is

included in the thematic area of Digitalization of Work, in the section on Digital Platform Work (https://osha.europa.eu/en/publications-priority-area/digital-platform-work) (17)

Specifically, one of the results of the main studies, the main challenges of the OSH management in the digital platforms, are summarized (16), see Table 1.

Table 1 EU-OSHA Overview of the challenges of OSH management in platform work

Area of OSH management	Relevant articles of the OSH Framework Directive	Challenges of digital platform work
Conducting a risk assessment	Article 6(3) and Article 9(1)(a)	Digital platforms defer responsibility of risk assessment to digital platform workers. Collective risk assessments are replaced by personalised, individual risk assessments.
		Virtualisation of work and a lack of a common protective workplace complicates risk assessments.
		Digital platform workers lack the necessary knowledge and training on how to properly conduct risk assessments.
Implementing preventive and corrective measures	Article 6(1) and Article 6(2)	Digital platforms defer responsibility of the implementation of preventive and protective measures to digital platform workers.
		The prevention dimension is often poorly taken into account, with compensation and efficiency of the tasks performed being prioritised.
		Collective measures are marginalised in digital platform work, with digital platforms intermediating on-location services often limiting themselves to the provision of PPE to digital platform workers
Providing information to workers	Article 10	Although digital platforms are in constant contact with digital platform workers through algorithmic management, OSH issues are rarely communicated to digital platform workers.
Consultation of workers	Article 6(3)(c) and Article 11	Digital platform workers are not consulted on OSH issues, mainly because of the lack of representation and collective organisation.
Training of workers	Article 12	Digital platforms provide little or no training on safety and health.
Adequate controls and supervision	Article 6(3)(c) and Article 11	Blurred responsibilities between digital platforms, digital platform workers and clients complicate enforcement of OSH obligations.
		Triangular relationship, virtualisation of work, dispersed and diverse workforce and high turnover of labour complicate enforcement by labour inspectorates.

Additionally, the current European Campaign on Healthy Workplaces (HWC 2023-2025), promoted by the EU-OSHA, is entitled “Safe and healthy jobs in the digital era” that includes among 5 priority areas the Digital Platform Work. In the website of the HWC a specific section full of information and examples on this topic is offered. (18)

All these studies and recommendations should be considered when modifying the Occupational Safety and Health Law and its associated regulations and technical norms. And specially to provide practical tools to employers (companies that operate digital platforms) that guide them on how to alleviate the occupational risks that their workers may suffer in digital platforms and improve their health and safety.

DELIVERY WORK RISKS AT DIGITAL PLATFORMS

Platform work risks

Digital Platform Work entails significant challenges on safety and health. First the inherent risks to the type of job and tasks (transportation, delivery, cleaning, etc.) in aspects of ergonomics, safety and health in general and psychosocial risks. And those are aggravated by the specific risks generated by working through digital platforms.

Such specific risks derivate first from the use of the digital platform when performing the tasks, and on the other hand due to the way the platform's algorithms organize that work. Most of them as additional psychosocial risks.

These specific risks have been categorized (11) based on their origin:

a) Permanent digital connection: the need to be permanent connected while waiting to receive orders with no predictability about them.
b) Mobility risks: the use of the Smartphone for receiving orders, confirming them and indicating that you have finished, in conjunction with driving a vehicle.
c) Pressure on the work pace from the client and the digital monitoring of work: the work pace is determined by the client or by an algorithm; privacy and monitoring of task execution through technological systems.
d) Risk of a solitary work: the isolation or invisibility of the worker, the loss of social contact.
e) Risk of sexual harassment: work in front of the public involves the possibility of sexual harassment.
f) Job instability: the very existence of precariousness, unpredictability and uncertainty at work and the earnings to be received.
g) Occupational risks associated with algorithms: the existence of an algorithm or artificial intelligence as a manager and director of work.
h) Occupational risks associated with the digital reputation system: the transfer of control from workers to clients through the evaluation of their performance (digital reputation in the platform)

Added to the previous risks, we have two considerations that aggravate the situation of platform workers on their safety and health at work:

› Lack of awareness of these risks.
› The non-application of the occupational risk prevention regulations

The above are particular elements of platform work and are source of risks, many of those as psychosocial risks, that deserve a specific risk analysis of their effects on the health of platform workers.

Food delivery work risks

In the case of food delivery workers, we can identify some specific risks, such as:

a) The Vehicle: the vehicle is a main risk factor, both its driving (in complex conditions of traffic and weather) and the vehicle maintenance (the lack of proper maintenance itself means additional risks).
b) Lack of PPE. Specific PPE for fall prevention and adverse atmospheric conditions (certified full-face helmet, appropriate clothing, jackets, suits, gloves, boots and back protectors, and visibility elements such as reflective vests, lights, etc.).
c) Weather Conditions. Adverse weather conditions such as rain, ice or stifling heat, etc., seriously affect driving, causing fatigue or falls (skidding, aquaplaning, fog, heat, wind).
d) Organizational Factors: the absence of initial and periodic risk assessments, the lack of information or incomplete training in prevention of general occupational risks and on mobility risks, the high temporality and turnover of personnel (lack of experience).
e) Human Factors. Aspects such as fatigue, distractions, sleep, etc; and additions, not only to alcohol and other drugs addiction, but also digital addiction (abuse in the use of technologies, social networks, etc.).

As conclusion, a detailed analysis of all possible risks, also from the psychosocial perspective, that must be carried out jointly with the definition of a detailed plan of preventive actions for each of them, including awareness and training, to build a safety culture throughout the organization. The systems that constitute the digital platforms and its algorithms must be considered in this prevention plan, for their possible modification and adaptation to minimize the risks derived from their use and operation.
Very important to consider the platform and algorithms as a relevant and suitable tool to incorporate many of the preventive measures on the rest of the risks and the training actions. Training in prevention, occupational safety and health behaviours and on mobility safety, as well as a mean to send warning messages, reminders and safety alerts to platform workers, individually if possible. The platform could serve to distribute practical recommendations to improve their safety and physical and psychosocial health and build a real safety culture among platform workers.

PERSPECTIVE OF GENDER, RACE, NATIONALITY AND AGE WITHIN DIGITAL PLATFORMS: OCCUPATIONAL RISKS ASSOCIATED

Diversity in platform workers

Although there are no official figures or studies on the percentage of female workers and from other nationalities who work for digital platforms. According to the type of service we find a greater representation of women and workers of other nationalities in some activities than in others in the platform work. Thus, in care services, aesthetics, cleaning, we mostly find female workers with a greater prevalence of women of foreign nationalities, however, in the case of food delivery work, the female presence is practically non-existent, although regarding race or nationality, we do find a higher incidence of migrant workers.

EU figures from COLLEEM II2 and AMPWork3 about digital platform work (DPW) in Spain show the workers profiles:

- They are younger (under 35 years old) than the rest of the working population.
- Greater presence of men, especially when work on digital platforms is the main job.
- Greater presence of women when DPW is not their main job.
- Prevalence of higher education (63.5%) compared to other jobs (49.5%).
- foreign born workers slightly higher in DPW than in other jobs
- DPW in a moonlight job situation (many jobs), DPW as secondary employment
- The most frequent geolocated DPW activities are in personal services at home (28.3%) and home delivery work (25.7%).

It is clear that, along with the risks previously indicated for digital platform workers, when gender, sexual identity, racial or ethnic variables are introduced, these platform workers (in any version, online or geolocated) assume new psychosocial risks:

- Moral, racial or ethnic harassment (degrading comments, threats with bad reviews)
- Sexual harassment (unwanted petting, sexual requests, assaults)
- Harassment based on sexual identity (homophobic insult)

The evidence shows that the gig economy not only encourages, but increases the risk of sexual harassment, violence and other psychosocial risks, which undoubtedly has a greater negative impact on the safety, well-being and vulnerability of women. The delivery ladies carry out their activity in a hostile work environment, where the delivery women are subject to attacks, situations of abuse and robberies.

ILO Convention No. 190 on violence and harassment in the world of work includes a definition of violence and harassment in its first article:

- (a) the term “violence and harassment” in the world of work refers to a range of unacceptable behaviours and practices, or threats thereof, whether a single occurrence or repeated, that aim at, result in, or are likely to result in physical, psychological, sexual or economic harm, and includes gender-based violence and harassment;
- (b) the term “gender-based violence and harassment” means violence and harassment directed at persons because of their sex or gender, or affecting persons of a particular sex or gender disproportionately, and includes sexual harassment.

This definition is very broad so it can include physical or verbal abuse, threats and intimidation, belittlement, harassment, humiliation, stalking, etc.

It must be considered that the leap made is important by focusing on the fact that the harassment situation occurs “in relation to work or as a result of it”, and not so much the concept of “in the workplace”.
This Agreement will entail relevant modifications in our legal system regarding the prevention of situations of workplace violence and harassment, and is an opportunity for collective bargaining, equality plans and anti-harassment protocols to be carried out in accordance with it.

Algorithms and the Gender perspective

Digital platforms promote their model with respect to female workers, claiming that they are a bridge for equal opportunities between men and women since the algorithms are aseptic and

thanks to them, gender bias will be overcome. However, this is false, platform work reproduces the biases and discriminations that exist in other forms of work and in society in general.

There is not much data on whether working on digital platforms has different repercussions on men and women, but it already indicates that we are not immunized against gender inequalities either.

According to an ILO report, the most recent data reveals that new business models in the digital economy are perpetuating gender gaps. It has been shown that the algorithms used to find jobs can perpetuate gender biases.

Results from ILO surveys of workers on online and on-location digital platforms (taxi and delivery) show that although women find work on these digital platforms, they only represent four in ten of workers in web-based platforms and one in ten on location-based platforms.

Algorithms can be discriminatory, because their reliability depends not only on how they are designed, but also by whom they are designed (mainly men).

The Women and Digitalization report on gender gap and algorithms, from the Spanish Women's Institute and Equal Opportunities, points out that only 12% of the people who participate in the development of this type of innovations and high level decision-making are women. They also state that “These algorithms reproduce false beliefs about what the physical attributes that define people should be like according to their biological sex, their ethnic or cultural origin, or their sexual orientation.

Regarding the food delivery workers, in an interview with Mr. Fernando Garcia, delegate of Glovo UGT Union, published in the digital media ‘Articulo 14’ by journalist Mrs. Laura Vilamor, (19), Mr. Garcia stated:

> *The algorithm system that the company manages is very hostile to women and separates them from this type of jobs. The system allows the evaluation of customers, restaurants and the platform itself. And those clients can be good people, but they can also be drunks, harassers, sexists, racists, and they have power over you because they value you. And that negative evaluation becomes a penalty.*
>
> *They stop receiving orders, they suspend you for a day, three days or three weeks and this happens to lots of women. They may get bullied, why don't you smile? Look, I'm making a sad face... a sexual harasser quickly discovers the power he has over a precarious worker.*
>
> *In this case, the company does not help you, on the contrary, it penalizes you and that generates cascades of sexual harassment from colleagues who go to the homes and that is why there are few delivery women, because they are fed up. And that's because they don't have a payroll, they don't have a contract.*
>
> *Another problem with the algorithm is that it takes you off course if you spend a lot of time out of service to look for, for example, a bathroom. Women do not have as much ease as men to do it quickly and the algorithm penalizes them, “it only sees that you disconnect for more than five minutes, and you can hang out for hours without orders. Men can go to the bathroom very quickly, but women cannot. This is an implicit gender bias in the algorithm.*

The conclusion of these situations is that there are hardly any women delivery workers. There is also fear because the company disconnects you, that is, fires you."

CONCLUSION

In conclusion, it is becoming evident that the generic and specific risks suffered by digital platform workers when they are women, the risk of suffering harassment or sexual assault, multiplies, and additionally the algorithms continue to have a gender bias component, which penalizes women.

Finally, it should be necessary to consider the platform and algorithms as a relevant and suitable tool to incorporate many of the preventive measures on the rest of the risks and the training actions. Training in prevention, better occupational safety and health behaviours and on mobility safety, as well as a nice mean to send warning messages, reminders and safety alerts to platform workers, individually if possible. The platform could serve to distribute practical recommendations to improve their safety and physical and psychosocial health so as to build a real safety culture among platform workers.

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4 Finnish Case – Labour Laws on Platform Workers

Labour Laws on the Employment Relationship and Platform Workers in Finland

Pia Perttula, Laura Seppänen & Riikka Ruotsala

Abstract — This article discusses the viewpoints of legislation concerning platform work. The directive will oblige EU countries to introduce into their legislation a rebuttable presumption of employment for platform workers. In Finland the critical question is whether the platform worker is working as an employment-based or as an entrepreneur. The Occupational Safety and Health Act applies if the characteristics of an employment relationship are met. An entrepreneur is responsible for their own occupational safety and health. For societal decision-making, it is important to have more information about new forms of work arrangements.

Keywords — Algorithmic Management, Occupational Safety and Health, Platform Work

INTRODUCTION

The European Parliament has approved the Platform Work Directive. According to the directive, the contractual relationship between a digital platform that mediates work and a person performing work through that platform is legally presumed to be an employment relationship. The directive aims to ensure that the status of those working in the platform economy is correctly defined. The directive obliges EU countries to introduce into their legislation a rebuttable presumption of employment for platform workers. This aims to address the imbalance between the digital platform and the platform worker. The challenges associated with it are similar across different EU member states, which is why regulation at the EU level is necessary. This paper introduces the expert views from Finland on the directive in the perspective of occupational safety and health.

The Member States must implement the Platform Work Directive by 2 December 2026. In Finland, the Ministry of Economic Affairs and Employment has set up a tripartite working group to prepare the legislative amendments required to implement the directive. Besides the Ministry of Economic Affairs and Employment and labour market organisations, the working group has representatives from the Ministries responsible for occupational safety and health, protection of personal data and social security issues. The task of the working group is to prepare a report in the form of a government proposal that includes proposals for the legislative amendments required to implement the directive. (Finnish Government 2025) In January 2026, the report, including proposals, will be publicly sent to circulation for issuing statements.

The directive introduces several information obligations for platform companies, primarily focusing on transparency related to algorithm use. These obligations require companies to inform workers and their representatives about automatic monitoring and decision-making systems, alongside conducting a data protection impact assessment. (EU 2022)

MATERIALS AND METHODS

Interviews

The participants comprised of four civil servants and experts who are familiar with the Directive (EU) on improving working conditions in platform work (2024/2831) and its effect on occupational safety and health. Recruitment efforts included outreach through email. Potential participants were provided with detailed information about the study's objectives, procedures, and confidentiality protocols prior to their voluntary participation. Informed consent was obtained from each participant before their inclusion in the study, reaffirming their understanding of their rights, the study's purpose, and the use of collected data in accordance with ethical guidelines outlined by the Ethics Board of the Finnish Institute of Occupational Health (FIOH).

Materials

The primary measures for data collection involved four semi-structured interviews conducted with participants. These interviews were performed to assess the legal and practical safety consequences of algorithmic management on employers and platform workers.

An interview protocol consisting of semi-structured interview questions and themes based on the topic of interest was used for the guidance of these interviews. Previous interview protocols made by international research partners were also utilized so cross-country and temporal comparisons could be accounted for. Ethical considerations were paramount in the selection and utilization of materials, with careful attention paid to safeguarding participant confidentiality and privacy throughout the data collection process.

Procedure

Data collection methods comprised semi-structured interviews conducted via Teams or in-person, allowing for in-depth exploration of participants' perspectives and experiences related to legal and practical safety consequences of algorithm management.

The research design adopted for this chapter was qualitative, aiming to elucidate the multifaceted dimensions and complexities inherent in the phenomenon under investigation.

Upon collection, the data underwent examination to identify and address potential outliers or discrepancies. Regarding the data analysis strategy, a thematic analysis approach was utilized to identify, analyse, and report emerging patterns and themes from the interview transcripts. This involved a recursive process of familiarization, theme development, and revision, ensuring a comprehensive exploration of the qualitative data.

Throughout the procedure, strict adherence to ethical guidelines was maintained, ensuring participant confidentiality, voluntary participation, and informed consent. The entire process

aimed to uphold the highest standards of research integrity and methodological rigor to warrant the credibility and trustworthiness of the study's outcomes.

RESULTS

The analysis of the four interviews revealed prominent themes that encapsulate the participants perspectives on the interaction between algorithmic management and their connection to occupational safety and health. The results highlight perspectives and viewpoints that emerged during the interviews. Main themes were related to health, safety and wellbeing and new regulatory topics.

The present state

The national legislation recognizes platform work rather weakly. The essential question is whether platform work is done in an employment relationship, which is determined based on the characteristics of an employment relationship as defined in our Employment Contracts Act. It is also important to examine the obligations of platform companies, specifically whether they have employer-related obligations.

If the work is employment-based, the employer is responsible for occupational safety and the health or arranging occupational health services for employees. In contrast, an entrepreneur is responsible for their own occupational safety and health. From the perspective of the occupational safety authority, there is no specific regulation for platform work in Finland.

The EU has reached an agreement on a directive to improve working conditions in platform work. Once the directive was published in November 2024 (EU 2024), a two-year implementation period will begin. Thus, within two years of publication, member states, including Finland, must implement this directive nationally.
Regarding the directive, it's important to first determine whether the work is indeed platform work, meaning work that is done through a digital platform. The obligations from the directive depend on whether the worker, the platform worker, is in an employment relationship or is an entrepreneur.

It's crucial to understand whether the term "platform worker" refers specifically to someone in an employment relationship or the broader concept of a worker, who is essentially an individual, a natural person, not in an employment relationship.

Health, Safety & Wellbeing dimensions

It is essential to examine the criteria for an employee in the Finnish Employment Contracts Act. The Occupational Safety and Health Act applies if the characteristics of an employment relationship are met. The question is whether platform work is done within an employment relationship. An entrepreneur is responsible for their own occupational safety and health.

Health, Safety and Wellbeing risks

Platform workers face the same occupational safety and health risks as other workers. During the interviews the following topics were discussed: possible new risks, risks related to mental health and being informed about health, safety and wellbeing risks.

Since most platform workers in Finland are classified as entrepreneurs, this somewhat weakens their occupational safety and health protection. The EU already has regulations on occupational safety. Finland’s national legislation is designed to align with EU regulations.

During the preparation of the platform work directive, Finland has assessed these directive obligations to ensure that national legislation meets the requirements of the platform work directive from the perspective of ensuring occupational safety.

Among new risks, climate change was mentioned in the interviews, as it causes warming or rising temperatures. Not all platform work is not done outdoors, but climate change is particularly relevant for outdoor work, such as food delivery, where various risks related to hot temperatures may arise. Examples include potential heat-related illnesses, exposure to UV radiation, and extreme weather conditions. In hot and warm conditions, employers should ensure that employees have appropriate clothing and protection against heat, opportunities for breaks, access to water, and protection from sun exposure. Employers must evaluate ways to prevent these risks. Platform workers who are independent contractors should know how to independently manage these risks.

Climate change and warming can affect the spread of insects, and new mosquito species may appear in Finland, potentially spreading new diseases. Mosquitoes might also be active during the day. Thus, for outdoor work, the risk of exposure to various mosquito-borne diseases spread through bites could become a new risk.

Additionally, platform work heavily relies on technology, and for on-site tasks like food delivery, technology use is a risk to consider. It is typical for platform work to involve smartphone use, while tasks are managed through a phone and app. In platform work that is online, risks related to work ergonomics may become more pronounced. The need for breaks and ergonomic considerations also becomes important.

Platform work can also involve new types of mental health risks. For example, online work might involve identifying images or material containing violent or inappropriate content. Exposure to such content through work can affect mental health. Psychosocial risks associated with platform work can also be caused from working alone, whether it's online or on-site, like food delivery. If platform companies do not provide means for social support, the absence of a workplace for gathering and receiving support from colleagues might highlight psychosocial risks and the isolation of working alone. Additionally, the lack of a direct supervisor means the absence of support that could facilitate discussions and address personal needs and challenges. Working hours are another risk, as the absence of an employment relationship means no adherence to working time regulations, leading individuals to manage their own time. This can blur the line between work and leisure.

Employers are obligated to continuously assess occupational safety risks. For platform workers who are not in an employment relationship, this responsibility falls on them. There is a risk that they may not have the skills or means to address these issues independently.

New regulatory oversight mechanisms

The interviews revealed four oversight mechanisms, focusing on the sufficiency of monitoring and inspection resources, the jurisdiction of existing authorities, the role of the data protection authority, and the potential complications of establishing new oversight bodies.

An agreement on the new directive has just been reached, so the first step is to implement it nationally. Only after implementation can the effects of the regulation and any need for

additional measures be assessed. Oversight might need to be expanded toward entrepreneurship, including light entrepreneurship.

The directive indicates that monitoring and inspection resources in member states must be sufficient. It should be assessed whether new mechanisms are needed or if existing authority resources just need strengthening. In Finland, the Regional State Administrative Agency (AVI) enforces occupational safety.

Naturally, oversight would fall under the jurisdiction of existing authorities. When the focus is on data protection aspects, it's quite logical for the data protection authority to handle it. In Finland, the Office of the Data Protection Ombudsman is the national counterpart for this. Regarding occupational safety and health perspectives, it's traditionally considered that the occupational safety authority plays a very central role.

If more new oversight authorities were established, overlapping jurisdiction could easily occur, leading to uncertainty about which authority is responsible for a particular issue.

Algorithmic Management

The directive will regulate various information obligations for platform companies. Most obligations involve providing workers, whether in an employment relationship or as entrepreneurs, with information about the use of algorithms. The directive will require platform companies to conduct a data protection impact assessment. It also mandates informing platform workers and their representatives about the use of automatic monitoring and decision-making systems. If there is no workers' representative, the information must be provided directly to the workers.

In Finnish legislation, the Act on the Protection of Privacy in Working Life can require the provision of materials to authorities. Additionally, the occupational safety authority has a general right to information, allowing them to request any materials needed for oversight.

The directive aims for transparency. As part of increasing transparency, there are information obligations. This means providing platform workers, those in an employment relationship, with information about these systems.
Currently, there is the EU's General Data Protection Regulation (GDPR). Additionally, Finland's national data protection law complements the GDPR.

However, there have been conflicting views. For example, public discussions suggest that food couriers find it unclear on what basis jobs are offered to them. The occupational safety authority, on the other hand, is not aware of workers experiencing this as unclear.

Supervision of algorithmic management

The platform work directive will regulate supervision. Human supervision is addressed, requiring platform companies to ensure they have sufficient personnel resources to evaluate the impact of decisions made by automated monitoring or decision-making systems. However, a human must review and make the actual decision, not relying solely on the algorithm. Some of this is already in practice in sectors like banking and insurance.

The directive stipulates that individuals appointed to this task must have the necessary competence, training, and authority to perform it. They must also have the authority to overturn decisions made by automated decision-making systems if they prove to be incorrect. Those performing this so-called human oversight are protected against dismissal and retaliation.

The interviewees agreed that it cannot be categorically stated who can be considered a qualified person for supervising of key decisions of the algorithm. More important than a specific title or job description is that the individual has the skills and competence for the task, which is determined by the platform company itself. Understanding and expertise in occupational health and safety is the primary focus. It may not necessarily be one person but rather a group with appropriate expertise that regularly reviews the matter. In any case, the expertise of multiple individuals is required.

Enhancing platform worker protection beyond GDPR

The platform work directive strengthens the protection of platform workers beyond what the GDPR already provides. The need for additional protection relates to algorithmic management. The directive includes supplementary and clarifying provisions to the GDPR regarding which data must never be processed and restrictions on the purposes for which certain data cannot be processed.

The directive includes several specific provisions that apply in addition to the GDPR. The GDPR also restricts similar matters, such as the platform work directive explicitly prohibiting the processing of personal data that can infer sensitive information, like political opinions, religion, beliefs, health status, and so on. There is also a prohibition on processing biometric data (e.g., facial movements).

Restrictions on data processing in platform work

The platform work directive lists matters that cannot be processed or collected by automated monitoring or decision-making systems. Platforms are prohibited from processing any personal data concerning a platform worker's emotional or psychological state or any personal data related to the worker's private conversations.

Platform companies should enable platform workers to have discussions, for example, with their representatives, and any such private conversations between these parties must not be processed. Additionally, no personal data should be collected from the platform when a platform worker is not performing tasks or has logged out of the app.

Evaluating employment relationships in algorithmic oversight

Algorithms can be seen as a modern tool for employer oversight. The question is whether the use of algorithms indicates that the work is employment-based, meaning the worker is in an employment relationship with the platform company. It must be noted that the use of algorithms is not necessarily, in itself, proof of employment-based work. It is important to recognize whether the characteristics of an employment relationship are fully met: is the work done on behalf of the employer, based on a contract, for compensation, and under management and supervision?

DISCUSSION

Basically, platform work requires regulation by society, but businesses and platform users should also take on more responsibility than in traditional employment. Platform work offers flexibility and expands the market for both workers and buyers, but it also comes with risks and weaknesses. Occupational safety and health from the perspective of the platform worker and also from the perspective of legal responsibilities need to be discussed.

The recent agreement on the new directive marks a significant step forward, necessitating its implementation at the national level. This implementation will allow for a comprehensive assessment of the regulation's impact and determine whether additional measures are required.

Despite existing regulations like the EU's GDPR and Finland's national data protection laws, there is ongoing debate about the clarity of job allocation for platform workers, such as food couriers, which contrasts with the occupational safety authority's understanding of workers' experiences.

In Finland, the main point is whether a platform worker is considered to be in an employment relationship or not. Employees in an employment relationship fall under the employer's duty of care, whereas individuals not in an employment relationship are responsible for their own occupational safety. Similarly, they must independently investigate matters related to occupational safety and implement improvements.

Digitalization of platforms and algorithmic management present both challenges and opportunities for occupational safety. Opportunities include increased independence and the ability to influence how work is performed. In addition to traditional occupational safety challenges, there must also be readiness to address new risks, such as those arising from climate change.

CONCLUSION

The European initiative to establish legal rules regarding the qualification of the employment relationship of platform workers seems to be successful. The essential question is whether platform work is done in an employment relationship, which is determined based on the characteristics of an employment relationship as defined in our Employment Contracts Act. It is also important to examine the obligations of platform companies, specifically whether they have employer-related obligations.

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5 Norwegian Labour Laws on Platform Workers

Occupational safety, health, and wellbeing dimensions within Norwegian Labour Law and their relationship with European regulations on the employment relationship and platform workers

Ivonne Herrera, Marie Nilsen & Trond Kongsvik

***Abstract*—**This article explores the challenges posed by platform work to existing legal frameworks in the European Union (EU) and in Norway focusing on workers´ occupational safety, health, and well-being (OSHW). It identifies safety-relevant dimensions of labour law, platform law, mobility regulations, and environmental protection legislation that become inapplicable in the context of platform work. The analysis examines how current OSHW rules are applied to platform work, considering both low-risk and high-risk scenarios. It uses the specific cases of courier deliveries as examples. The study compares the current state of regulations in the EU and Norway, highlighting discrepancies. Finally, recommendations to bridge the identified gaps and ensure proper oversight of OSHW threats and opportunities within the platform work landscape.

***Keywords*—** Risk regulation, platform-mediated work, gig economy, digital labour platform.

INTRODUCTION

Labour through digital platform is a rapidly growing form of work, presents complex regulation and policy challenges to the established bilateral employer-employee relations. Platform-mediated work (PMW) encompasses paid labour that relies on digital platform for its execution and coordination (Lenaerts et al., 2021). It includes a triangular relationship between workers, platform owners and customers where coordination is done on-demand or temporarily through the digital platform. In one hand the PMW is attractive to some workers in terms of additional source of income and flexible working conditions. On the other hand, it raises important concerns such as job and income security, social protection, development and training, and protection against social discrimination (OECD/ILO/European Union, 2023).

Work regulation aims to protect workers' safety and well-being under combines rational of human rights, information and unequal power bargain (Baldwin et al., 2011). Policy makers in many countries have recognized the challenges posed by PMW and are taking steps to improve working conditions. On policy, the European Commission released a directive on "Improving the working conditions of people working through digital labour platforms" (European Commission, 2024), focusing on issues related to employment status, algorithmic management, enforcement, transparency and traceability. There are aspects of PMW that are difficult to grasp with regulations such as the trend of increasing work precarity, seen previously in outsourcing and introducing different work content, distribution and digital control making a paradigm shift in labour management.

An essential aspect of regulation is the protection of critical societal values by limiting the discretionary space of relevant actors (Grote & Weichbrodt, 2017; Størkersen et al., 2024). Power is an important dimension of the regulation as it provides limits to the power to the involved stakeholders and assigns authorities the power to limit the power of others. This manuscript is based on and summarizes lessons learnt from the PhD thesis "Health, Safety, and Working Conditions in Platform-Mediated Work: A Multilevel Perspective" (Nilsen, 2023) complemented with recent advances in regulation. This paper focuses on regulatory challenges in the Norwegian context to ensure work conditions, occupational, health, safety and well-being (OSHW) in PMW. It combines updated on recent research and empirical data from interviews with diverse stakeholders.

The core of the problem

It has been noticed that established firms face fierce competition from platform companies, which take advantage of opportunities created by gaps in regulations (Calo & Rosenblat, 2017; Pollan, 2019). There are two primary areas of concern in the PMW regulation (Piasna et al., 2022). These are the status of the employment and algorithmic management feature that distinguishes platforms from traditional way of working (Schor et al., 2020).

Power is central in the employer-employee relation as well as management mechanisms. The study of power enables a deep understanding of the gaps in regulatory frameworks and mismatch between the regulator and regulated entities. The overall objective of the study is to investigate misalignments between the power of labour platforms and regulator capabilities, to identify gaps in the Norwegian context concerning regulation of PMW, and to propose interventions to address any potential gap.

There are diverse approaches to study the power PMW have within their reach (Bachrach & Baratz, 1962; Dahl, 1957; Lukes, 2021). This study is driven by three salient dimensions of power: direct power (ability to implement observable changes), the agenda power dimension (influence through action or inaction) and the symbolic dimension (influence over other stakeholders to adopt goals, attitudes and values of the dominant stakeholder).

European and Norwegian regulations on the employment relationship to platform workers

There is not a single, comprehensive European regulation dedicated to OSHW of PMW workers. Since this is an area of increased concern, there are several emerging regulations together with EU initiatives that are relevant to this type of work. The most important developments concerning employer-employee as well as management mechanisms are as follows:

The existing EU occupational safety and health directive (European Commission, 1989b) is the overarching directive laying down principles of occupational risk, the protection of safety and health of workers, as well as elimination of risk and accident factors. The EU platform work directive (European Commission, 2024) targets the improvement of the working conditions of platform workers. Regarding OSH, this directive has implications for the correct employment status, promotion of transparency, fairness, human oversight and accountability in algorithmic management. In addition, it includes requirements for data protection of workers' personal data, risk assessment of AI tools, ensuring that these tools do not pose a risk to workers physical and mental health. There are other more specific directives complementing the overarching directive addressing risks such as the work equipment directive concerning platform workers using own vehicles and tools (European Commission, 2009), personal protective directive applicable when work requires specific safety equipment (European Commission, 2016), manual handling directive which is important for delivery workers (European Commission, 1990) and workplace directive which sets out minimum requirements for the workplace (European Commission, 1989a).

The Norwegian OSH regulation is primarily governed by the work environment act (Ministry of Labour and Social Inclusion, 2006). It aims to secure safe employment, secure working environment, to promote good collaboration between employers and employees as well as an inclusive working life. It has a strong emphasis on employer responsibility, employee participation, and proactive measures for risk management. This act is complemented by other regulations covering specific workplace hazards and conditions. There is no specific Norwegian legislation addressing platform mediated work, there are ongoing discussions to ensure adequate protection for platform workers such as bordering the scope of the work environment act to deem platform worker under Norwegian law, revise employee definition to ensure that employee relation with a platform is covered by the act's protection. In 2024, the act was amendment requiring more information in the employment contract including place of work and working hours that are relevant and diverse for platform workers. The EU platform work directive is likely to influence and shape Norwegian requirements through the European Economic Area (EEA) agreement, which aligns Norwegian regulations and practices with EC directives.

Norwegian regulations through power as analytical framework

In Norway, the main governmental body overseeing occupational safety and health in land-based operation is the Norwegian Labour Inspection Authority (NLIA). This agency comprising of around 600 staff across 16 district offices, 7 regional offices and a central directorate. Within 2024, NLIA conducted 12890 inspections. It was uncovered 33,600 breaches in regulation where the highest proportion with violations was related to psychosocial working conditions (Arbeidstilsynet, 2025). The NLIA toolbox has four main strategies for sanctioning violations of the Work Environment Act (WEA): orders, coercive fines, the closure of operations and law enforcement involvement in serious violations. NLIA's direct power is based on a state-vested authority over enterprise compliance with WEA corresponding to a rule-based interpretation of the regulation.

NLIA's oversight activities include regulatory development, supervision, knowledge sharing, guidance, cooperation, internal control, audits and accident investigations (Arbeidstilsynet, 2025). NLIA is part of tripartite collaboration where social partners (regulators, labour unions and employer associations) are represented to solve OSH issues in a consensus-based

manner (European Agency for Safety and Health at Work., 2024). Successful tripartite collaboration is highly dependent on the quality of the interaction between the involved parties. The involvement of diverse stakeholders in the regulatory work empowers different participants in co-development the agenda related to OSH working conditions.

The Norwegian regulations are functional regulations, leaving the responsibility for continuous improvements to the enterprises' own safety management systems. This self-regulation is incorporated into the tri-partite cooperation. This cooperation reflects overarching goals and the welfare state model of Norwegian egalitarian values and mutual trust (Lindøe et al., 2012, 2017). Functional regulations leave the enterprises with the selection of specific methods to improve OHS, enabling them to work towards overarching goals without detailed restriction of their discretionary spaces.

The intersection of these power dimensions provides different dimensions of social and economic influence contributing to an enhanced understanding of regulatory gaps.

METHODS

The qualitative study combines semi-structured interviews and an interpretative approach to gain insights into worker experiences. The data set included 58 interviews as follows 32 interviews from platform workers, 4 interview representing platform enterprises views', 8 workers representing unions and employers' associations and 5 with NLIA regulators. The rational to include numerous workers in the interviews is to bring attention to the new reality platform workers are facing in comparison with other types of work.

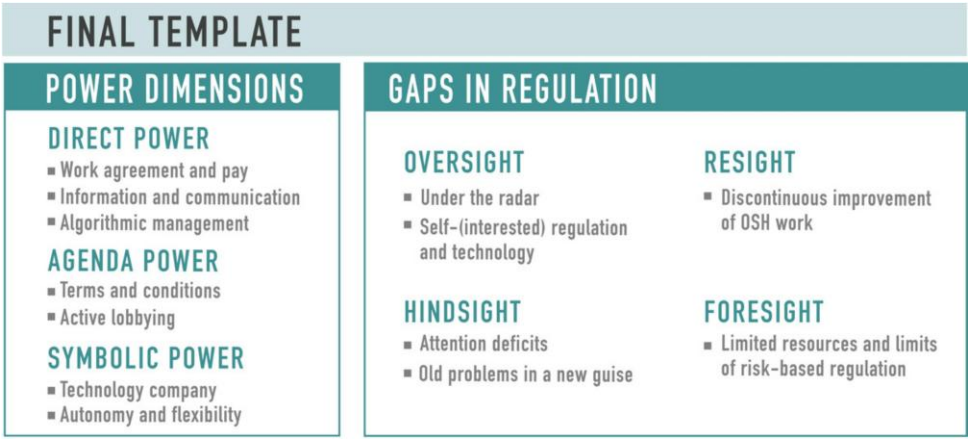


Figure 1 Final template for the analysis (Nilsen et al. 2022)

The interview includes diverse topics related to platform work and its ranking systems), working conditions, communication means, health and safety knowledge, knowledge about regulations and regulatory challenges in PMW. The interview guide allows some flexibility to ensure issues that were important to the interviewees were considered. A thematic analysis (King & Brooks, 2017) was implemented where six themes explore the concepts of power and regulation: (1) direct power, (2) agenda power, symbolic power, (4) regulation as a set of commands, (5) regulation as deliberate date deficiency and (6) regulation as form of social and economic influence. The software used for the coding was NVivo. Figure 1 illustrates the final template for the analysis. It shows two main categories the power dimensions according to Lukes' three power dimensions and gaps in regulation.

RESULTS

Two delivery platforms are registered in Norway as “Other postal and courier” services. These platforms have slightly different practices. The first company (PC1) has both employees and freelances where the other company have self-employed delivery service providers. Both companies require individual investment in equipment essential to provide service including protective gear.

Concerning oversight company with employees have a safety representative who monitors the use of personal protective equipment (PPE) even if self-employees are not covered by WEA. However, there seems a disregard for protective equipment among the independent contractors. A testimonial that illustrates this is: *“ it is just plain luck that no one has broken their skulls yet”*. Although similar situations has reported by several interviewees, severe and fatal accidents have been occurred in other countries. The interviewees reported a contrast between the mechanisms integrated in the app and actual response towards this algorithmic safety management as illustrated in testimonial summarized below:

“One problem with being managed by an app is that training occurs virtually, which results in many not understanding its content, others conducting your work or no physical checks on the equipment. It’s pandemonium combined with people who do not have a clue about their rights and duties like accident reporting.” (PC1, Employee-17)

There are diverse testimonials how platform work presents diverse form corresponding to Lukes’ three-dimensional view. A summary of testimonials related to power dimensions are presented in Table 2.

Table 2 Power dimensions and PMW experiences.

Power dimensions and PMW experiences
Direct power is implemented in the app determining work processes and related released information.
Interviewees agree that the app highly manage the work processes. *“It would be an easy job if all is well organized, [. . .] it is sometimes absurd to just follow the app when it is wrong.”* (PC1, Employee-8) The internal ranking system combined with rate payment have ramifications for when diverse workers can access available time slots. This is often based on individual performance, motivating workers to increase speed and take shortcuts. *“Sometimes, when there is traffic and I am late with the delivery, I drive past a yellow light [. . .] Yes, time pressure. There is a lot of traffic in the city centre and sometimes I do not manage to be on time.”* (PC2, Freelancer-5)
Agenda power is implemented in the app selecting issues that fall in that fall within scope or outside the decision-making scope.

Power dimensions and PMW experiences
Communication is usually one way, with platforms controlling agenda and selecting issues *"The communication platform connecting [workers] directly to management has been removed; therefore, e-mails are the only point of contact."* (PC1, Employee-14) Terms of use with consent requirements and details unknown. Changes in payment and bonus can occur without workers being aware or having an influence on this fact. *"They changed it without talking with me actually. They did not contact me because my contract says [. . .] so I am not complaining because every day I get good money and focus on myself."* (PC2, Freelancer-8)
Symbolic power is exercised through the companies' websites attracting workers by stressing flexibility. Still, this flexibility is constraint by scheduling and performance implemented in the platform internal ranking system.
Individual responsibility for own safety is leaved to the workers independently that employers are subject to control mechanisms. *[. . .] "you are biking. Almost everything is the same app. The only difference is that instead of receiving a salary, you get it in the form of reversed invoicing."* (PC1, Freelancer-8) Companies select wording such as "courier partners" and refuse to use the words like 'shift' or 'turnover' in their communication to disregards the employer-employee relation. *"Turnover is a term that is usually tied to permanent employment [. . .] Turnover is not an important parameter when flexibility is in focus."* (PC2, Management)

Data findings show four types of gaps in the regulation of PMW: lack of oversight, hindsight, resight and foresight. The types are interrelated, and the aggregation complicates regulating. These four types of gaps are shown in Table 3.

Table 3 Gaps in regulation and PMW experiences.

Gaps in regulation and PMW experiences
Lack of oversight refers to knowledge limitations among stakeholders, conflicting goals and regulations, the inability of regulators to identify labour platforms, and a divergent platform concept of self-regulation
A new and important aspect is the knowledge about PMW and the workforce involved. In particular, there is little data on freelancers involved, and a study in 2017 substantiated the perception that PMW was a small segment (ref 92). However, this perception has changed, and there is concern that this work segment may be in a vulnerable situation. Platforms are self-regulating entities defining rules in the digital ecosystem (ref 93) *"'Oh, we are a different kind of company. We are doing things differently; therefore, different rules apply to us.' NO, no, no, no! Labour laws have been established for a reason, and you are trying to get around it to increase your profits."* (PC1, Employee-7).
Lack of hindsight through experience and building the capacity to address risks and manage potential occurrences systematically are thus crucial to preventing unwanted consequences

Gaps in regulation and PMW experiences
In contrast to major accidents as “focusing events”, which often facilitates regulatory change (ref 96), incidents and accidents that occur independently remain unseen by the public and do not create momentum for change. *“First, development must occur; then we must say there is a problem, then we must have an opinion on how to solve the problem, then there must be political will to solve that [PMW] problem rather than other problems. And there are very many who have interests in the NLIA’s work, not only politicians but trade unions and large communities that have the tremendous political weight to control much of what NLIA prioritizes to do and implement. [. . .] Unless there is a lot of fuss about the sharing economy, I do not think anything will happen either.”* (Regulator-3).
Lack of resight as missing the ability to re-engage with stakeholders through formal or informal social channels, to effectively facilitate dialogue and continuous improvement.
Sustained improvement demands a level of consistency that is challenging to achieve in precarious work contexts such as PMW. *“Getting a system to function is one thing, but people constantly leave, so one must start over frequently. You need to have good structure training. And how do you get involvement when people leave constantly? [. . .] Some do not care about the enterprise and just want to work and earn money. It is difficult to work towards a sound, continuous HSE system and be able to see its value along the way.”*(Regulator-5).
Limited information and resources, can lead to a lack of foresight, hindering regulators' ability to anticipate and effectively address emerging risks within existing risk-based regulatory strategies, thus impeding the implementation of essential preventive measures.
The economic and procedural burden underpinning implementation and adoption of risk-based regulation can impede prioritization of PMW (ref 105). The NLIA has limited resources relative the number of regulated enterprises. *“[. . .] we work with risk-based regulation, which means we also need to distribute the 500 inspectors across the 250,000 business entities across Norway. We also need to make hard prioritizations when we go on inspections, provide guidance, supervise, and advise.[. . .] We need to know that there is a working relationship in the platform economy before we can conduct an inspection or have anything to do with that matter.”* (Regulator-2).

CONCLUSION

The heterogenous nature of PMW, with its inherent the flexibility and workers turnover, makes it challenging for the regulator to apply a unified approach to guide and enforce applicable regulations. This study identifies four regulatory gaps concerning oversight, hindsight, resight, and foresight. The NLIA’s existing power and tools are designed for traditional employment, where a responsible enterprise employer ensures OSHW for their workers. The direct power in the traditional context is challenged by the PMW, where enterprises may operate within regulatory gaps that create economic advantages. A paradox emerges as PMW have considerable direct power over workers through the algorithmic management (Acquier et al., 2017; Rosenblat & Stark, 2016).

The Nordic countries’ regulatory system is the based on tripartite collaboration between employee, employee organizations (unions) and regulators collaborate face a challenge with PMW. This partnership is based on worker participation and mutual trust which can be difficult to establish in PMW (Engen & Lindøe, 2019; Hale, 2013; Lindøe, 2007). The regulator’s

symbolic power involves the to influence PMW to adopt these values. This is challenging as some of the enterprises are global with many workers as self-employed who do not participate in unions.

The study shows a growing interest in PMW, and new EU regulation could offer a window of opportunity to rethink how supranational and national regulations can address traditional, new and evolving nature of work. Future research could explore processes to align supranational, European Commission and national regulations in the PMW context, with particular attention on adapting the tripartite collaboration that enhances transparency and mutual collaboration.

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Part 2: Safety learning from risks

6 The Effects of Algorithmic Management on OSH in the Netherlands

The effects of Algorithmic Management on the Occupational Health and Safety of Delivery Workers: The Netherlands

Mairi Bowdler, Thijmen Zoomer, Niels Held & Coen van Gulijk

***Abstract*—**Algorithmic management (AM) is increasingly used to allocate, monitor, and evaluate work in digital labour platforms, raising important questions about its implications for occupational safety and health (OSH). This chapter examines how delivery workers in the Netherlands perceive the effects of AM and platform company structures on their safety, health, and working conditions. Drawing on semi-structured interviews with six delivery workers from two platform-based delivery companies, the chapter identifies both long-standing OSH risks in delivery work and risks that are intensified by AM. The findings show that weather conditions, traffic exposure, faulty equipment, app-based management, performance incentives, payment structures and limited organisational support can shape workers' safety behaviour and wellbeing. The chapter concludes that AM does not create entirely new occupational risks, but can intensify existing physical, psychosocial and organisational risks experienced by delivery workers.

***Keywords*—** Platform Work, Algorithmic management, Occupational Safety and Health, Delivery workers.

INTRODUCTION

Algorithmic management (AM) refers to the use of software algorithms to carry out managerial functions, supported by organisational mechanisms that allow these systems to allocate, monitor and evaluate work (Lee et al., 2015). AM is increasingly embedded in workplaces across Europe: estimates suggest that between 72.48 million and 101.05 million individuals in the EU-27 encounter AM at their primary or secondary place of work (European Commission, 2021, p. 173). This raises important questions for occupational safety and health (OSH), particularly where algorithmic systems influence workers' pace, autonomy, task allocation and access to support. Delivery work provides a relevant case because it combines long-standing physical risks, such as traffic exposure and adverse weather, with intensive app-based

management. In this context, AM may not create entirely new risks, but it may reshape or intensify existing ones.

Chapter focus

This chapter examines how AM and platform company structures shape the OSH risks experienced by delivery workers in the Netherlands. We first define AM and locate it within platform work. We then describe delivery work as a specific risk context, including the work process, worker characteristics and known OSH risks related to traffic, weather, equipment, work organisation and worker vulnerability. Finally, we consider how algorithmic systems may amplify these risks through monitoring, task allocation, performance incentives, transparency problems and reduced worker autonomy. The empirical analysis builds on interviews with delivery workers from two platform-based delivery companies.

Algorithmic management and platform work

AM is generally understood as the use of algorithms to assign, optimise and evaluate work (Lee et al., 2015). In workplace settings, these systems can influence where people work, how they work, who performs particular tasks and how work performance is assessed (Stacey et al., 2018). In platform work, AM is especially significant because the app often functions as the main interface between the worker and the organisation.
Digital labour platforms rely on algorithms and data-driven systems to coordinate large numbers of workers and clients (Jarrahi & Sutherland, 2019; Schildt, 2017; Wagenknecht et al., 2016). These systems commonly use worker data and metadata to allocate tasks, guide routes, monitor performance and manage availability (Ponce & Naranjo, 2022). For platform companies, this enables rapid coordination of short-term, on-demand work; for workers, it can make managerial decisions less visible and harder to contest.

Platform work is a subset of internet work: it refers to paid work that is mediated through online labour platforms, websites or mobile applications (Piasna et al., 2022). This includes remote tasks as well as location-based services such as transport and delivery. The distinction is useful because delivery work is both digitally mediated and physically performed in public spaces, making it especially relevant from an OSH perspective.

Table 4 summarises the distinction between internet work and platform work, based on Piasna et al. (2022). Delivery work falls within platform work because orders, task allocation and communication are mediated through a digital platform, while the work itself takes place offline and involves direct exposure to traffic, weather and customer interactions.

Table 4 Internet work and platform work categorization after Piasna et al., 2022.

Internet work	
	Platform work activities 1-5 & 10
1. Remote clickwork	Platform work
2. Remote professional work	
3. On-location work	

4. Transport 5. Delivery	
6. Influencing 7. Renting 8. Sell self-made products online 9. Sell or re-sell other products online	
10. Other freelance services or tasks	Platform work

Although estimates vary because studies define and measure platform work differently, platform work is now a recognised part of the European labour market (Urzì Brancati et al., 2020; Pesole et al., 2018; OECD, 2019). Fernández-Macías et al. (2023) estimate that around 1% to 2% of the working-age population engage in platform work as their primary occupation. While this is a relatively small proportion, the sector has grown rapidly, particularly in app-mediated services such as food and grocery delivery.

AM is therefore a central organising feature of platform delivery work. It allows platforms to assign tasks, coordinate workers, manage demand and shape workers' behaviour through app-based instructions, performance metrics and incentive systems (Lee et al., 2015; Veen et al., 2020; Wood et al., 2019). These features make platform delivery work an important setting for examining how digital management interacts with occupational risk.

Delivery work as a risk context

Delivery work is a relevant risk context because it combines algorithmic coordination with physical exposure in public space. Platform delivery workers are typically managed through apps that allocate orders, provide route information and structure communication with the company. At the same time, the work involves cycling or driving in traffic, working in changing weather conditions, interacting with restaurants and customers, and often working under time pressure. Existing research links platform-based transport and delivery work to accident risk, physical strain and psychosocial pressures (Barrios et al., 2023). This makes delivery work a useful case for examining how AM may interact with existing OSH risks.

Work process and exposure to risk

Delivery work usually involves transporting food or other goods ordered through an app, online platform or website (Piasna et al., 2022). Demand for these services has increased with the growth of mobile internet use, same-day delivery services and the expansion of food and grocery delivery, particularly during and after the COVID-19 pandemic (Ali et al., 2021; IGD, 2019; Order Meal, 2022).

A typical delivery process begins when a worker logs into the app and indicates availability. Once an order is accepted, the worker receives instructions for pickup and delivery, often including route guidance (also see Figure 2). The work therefore combines app-based direction with physical movement through traffic, frequently by bicycle, e-bike or scooter (Corr, 2019; Krier et al., 2022). Risk arises not only during the paid delivery itself, but also while workers wait for orders, reposition to busier areas, or interact with restaurants and customers.

Payment arrangements can also shape risk exposure. In many platform delivery models, workers are paid per order, meaning that waiting time, repositioning and other non-delivery activities may be unpaid even though they still involve exposure to traffic, public spaces and unsafe conditions. This distinction is important because workers' incentives and time pressure may influence safety-related decisions.

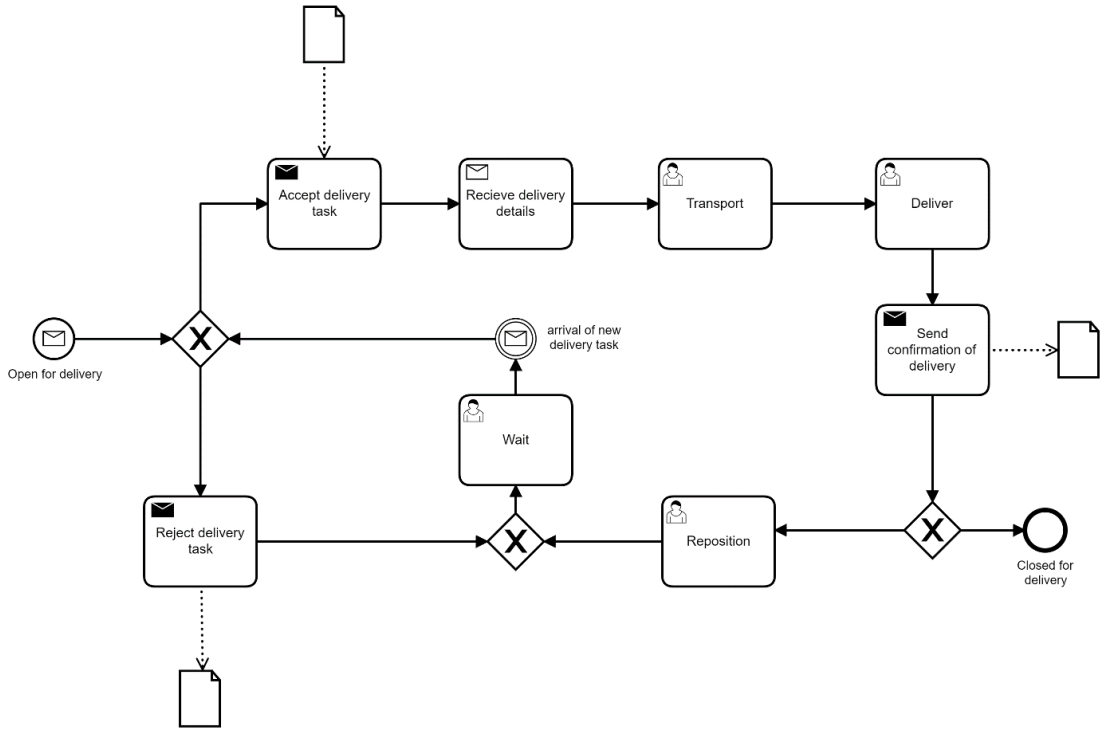


Figure 2 Business process diagram of delivery work

Worker demographics and vulnerability

Worker characteristics are relevant to OSH because delivery work is often performed by groups that may face particular vulnerabilities, including younger workers, migrants, students and workers with limited experience of local cycling or traffic conditions. Evidence from the ETUI Internet and Platform Work Survey provides insight into these patterns (Piasna et al., 2022).

It was found that the age differences between internet workers and non-workers are much more pronounced in the delivery sector. Those who have engaged in delivery work in the past or are currently had an average age of 35.7. Those who have done so in the past 12 months have an average age of 36.4. Those who had never been involved with delivery work had an average age of 42.5. This result is not surprising since delivery work is commonly performed via bicycles or scooters (Krier et al., 2022; and Corr, 2019), the prevalence of bicycles or scooters in delivery work could be a contributing factor to why individuals who have engaged in such work tend to be younger on average.

Men are predominant in both internet (53% male) and platform (54% male) work. Additionally, the data showed that delivery workers are mostly men (61% male). Further sources indicate an even greater prevalence of men in delivery work. For instance, according to a report from

the International Labour Organisation, which conducted surveys of platform workers in 2019 and 2020, only nine percent of delivery riders in 12 countries were identified as women (Fairwork, 2023).

While approximately 50% of remote internet workers hold a university degree, 30% of delivery workers held 'high' level of education. Interestingly, 10% of delivery workers fell into the category of low qualified employees, and the data revealed that within this sector, there was a comparatively higher representation of middle qualified workers (60%) when compared to other sectors in the same bracket e.g., transportation and on-location platform workers.

Migrants have a notable presence in delivery work, which stands in contrast to their comparatively lower representation in remote professional roles (Piasna et al., 2022). The data from the study further elucidates this pattern, revealing that 70% of individuals in delivery work were born in their current country of residence, while 9% originated from an EU/EFTA country, and 17% were born in non-EU/EFTA countries.

On average, people who do platform work tend to live in bigger cities compared to those who have never done platform work. Regarding the specific tasks, 60% of platform workers in larger cities were involved in delivery work, while 49% were doing remote platform tasks.

Overall, the demographic profile of delivery workers matters for OSH because age, employment status, migration background, urban location and prior cycling experience may shape workers' exposure to risk and their ability to manage it. These factors are not risks in themselves, but they can interact with platform organisation, training, language barriers, local traffic knowledge and economic dependency.

OSH risks for delivery workers

Research across several countries shows that couriers, particularly food delivery workers, face elevated risks of accidents and road safety incidents (Barrios et al., 2023; Christie & Ward, 2019). They are often considered a vulnerable group of road users because they work in public traffic environments under time pressure (Li et al., 2020). In the Netherlands, Veilig Verkeer Nederland reported that delivery drivers on scooters were up to six times more likely to be involved in road accidents than other private scooter drivers, with damages up to 75% higher (VVN, 2019).

Many of these risks are linked to the work activity itself. Delivery workers commonly use bicycles, e-bikes or scooters, which offer less protection than cars and can be affected by vehicle condition, road surface, traffic density and rider experience. Studies have linked bicycle and scooter-based delivery work to injury risk, equipment problems and unsafe road conditions (Gregory, 2021; Ioannides et al., 2022; Radical Riders, 2022).

Traffic exposure is one of the most frequently identified risks. Delivery work often takes place during busy periods and in urban areas where workers must navigate cars, cyclists, pedestrians and road infrastructure. Previous studies have reported that delivery workers themselves often identify traffic accidents as a central occupational risk (Perkiö et al., 2023), and international reports point to serious and sometimes fatal traffic incidents involving food delivery workers (Gregory, 2021; Mbare, 2023).

Delivery work can also create physical strain. Repeated cycling, long shifts, carrying loads and prolonged exposure to outdoor conditions can contribute to fatigue, pain and musculoskeletal complaints (Perkiö et al., 2023).

The social and physical work environment can create additional risks. Delivery workers may encounter verbal harassment, aggression, theft, unsafe locations or difficult customer interactions, all of which can affect both physical safety and mental wellbeing (Mbare, 2023).

Weather conditions are another important source of risk. Demand for deliveries may increase during heavy rain, snow, strong wind or extreme heat, precisely when working outdoors becomes more hazardous. Exposure to adverse weather can increase the likelihood of road accidents, slips and falls, fatigue, heat stress, cold-related illness and other health effects (Eurofound, 2018; Huws et al., 2017).

Algorithmic risk mechanisms

AM can influence OSH through several risk mechanisms, including monitoring, work intensification, reduced autonomy, opaque decision-making and discrimination risks (Todoli-Signes, 2021). In delivery work, these mechanisms interact with existing exposure to traffic, weather and physical demands.

Monitoring is one key mechanism. Digital systems can track location, performance, availability and behavioural data, which may contribute to technostress, anxiety, fatigue and pressure to meet targets (EU-OSHA, 2017; HSE, 2019). In delivery work, monitoring is often necessary for task allocation and route coordination, but it can also make workers feel constantly observed and evaluated.

A second mechanism concerns decision-making without context. When algorithmic systems allocate tasks, evaluate performance or restrict access to work without accounting for situational factors, workers may experience decisions as unfair, dehumanising or difficult to challenge (EU-OSHA, 2018; Moore, 2017). This may increase uncertainty and psychosocial strain, particularly when workers do not know how decisions are made.

For delivery workers, location tracking is closely tied to order allocation. Previous research has found that workers may have little choice but to consent to location monitoring in order to use the platform (Perkiö et al., 2023). Other forms of behavioural monitoring, such as tracking driving style or rule compliance, can also feed into decisions about compensation, availability or sanctions (Gurley, 2021; Kay, 2021; Mbare, 2023).

AM may also intensify work by setting tight deadlines, prioritising speed or encouraging workers to complete more tasks. These pressures can lead workers to increase their pace, extend working time or make riskier decisions in traffic. Previous studies link such intensity to fatigue, distraction, musculoskeletal complaints and accident risk (Christie & Ward, 2019; Dzieza, 2020; Lane, 2020).

The intensity of AM varies by task and platform design (Fernández-Macías et al., 2023). In delivery work, workload intensity can become an OSH issue when workers feel pressured to meet deadlines, avoid penalties, maintain ratings or maximise income through higher order volumes.

AM can also reduce autonomy by directing workers towards platform-defined optimal ways of working. This may limit discretion over route choices, pacing, task acceptance and learning at work. Reduced autonomy and limited influence over work organisation are associated with poorer wellbeing, stress and anxiety (Aloisi & De Stefano, 2022; Wood et al., 2019).

This reduction in decision-making can contribute to work alienation, especially when workers experience the algorithm as a distant but powerful form of supervision (Moore, 2017; Todoli-Signes, 2021). For delivery workers, this may be especially relevant when the app determines task flow but offers little explanation or human support.

A further concern is algorithmic bias. If algorithmic systems are trained on incomplete or historically biased data, they may reproduce unequal outcomes in access to work, ratings, account status or sanctions (Garriga Domínguez, 2018; Hardt, 2014; Möhlmann & Zalmanson, 2017). In a diverse delivery workforce, such risks may intersect with migration status, language barriers, economic dependency and limited ability to challenge platform decisions.

Risks may also arise outside the algorithmic system itself. Delivery workers are visible in public space and may be identifiable through branded clothing, bags or vehicles. This visibility can expose them to hostility from other road users or members of the public (Gregory, 2021), adding to the psychosocial and physical risks of the job.

Finally, platform companies often present app-mediated work as flexible and autonomous, but this flexibility may coexist with limited access to employment protections, unclear task allocation and weak channels for support (Lee et al., 2015; Rosenblat, 2021; Wood et al., 2019). For workers whose tasks and earnings are shaped by an algorithm, lack of transparency can contribute to frustration, uncertainty and anxiety (Gregory, 2021; Silberman & Johnston, 2020; Todoli-Signes, 2021).

Transparency is therefore central to OSH in platform delivery work. When workers do not understand how orders, ratings, rewards or penalties are decided, they may adapt their behaviour in ways that increase stress or risk-taking. This chapter uses interviews with delivery workers in the Netherlands to explore how these mechanisms are perceived in practice.

Despite growing attention to AM and platform work, there remains limited European research on how digital monitoring, task allocation and platform organisation affect working conditions and OSH in specific sectors (Fernández-Macías et al., 2023). Delivery work is therefore a valuable empirical setting because the risks are both physical and organisational, and because algorithmic systems are central to how the work is organised.

METHODS

Participants

The study is based on semi-structured interviews with six delivery workers who were working in the Netherlands for two international platform-based delivery companies at the time of data collection. In addition, one interview was conducted with an employer representative from a platform delivery company to provide contextual information about company organisation and work arrangements. Participants were recruited through purposive sampling because they had direct experience of platform-based delivery work and could reflect on OSH risks, algorithmic management and company support. All participants received information about the study aims,

procedures, confidentiality and data use before taking part. Informed consent was obtained from all participants, in line with the ethical procedures approved by the DPIA Ethical Committee.

Since the two companies assessed for this chapter differed in employment arrangements, payment systems, equipment provision and support structures, they are described separately below. To preserve anonymity, they are referred to as **delivery company A and delivery company B** throughout the chapter.

Delivery company A is a Dutch food delivery company that operates internationally. Delivery workers are hired through temporary employment agencies rather than directly by the platform. Workers can select contracts with specified working hours and shifts and are paid per hour rather than per delivery. Deliveries are made by bicycle. Bikes are either provided by the company or, when workers use their own bike, inspected by the company. In the Netherlands, this company has office spaces and communal hub areas where workers can collect bikes and other equipment for their shift.

Delivery company B is an American food delivery company that also operates internationally. Delivery workers are engaged on a solo self-employed basis. The company does not use fixed shifts or regular work schedules in the same way as delivery company A, and workers are compensated through a piece-rate payment system. Deliveries can be made by car, bicycle, scooter or on foot. In the Netherlands, the company does not have a comparable communal office or hub area for delivery workers.

Materials

Data were collected using a semi-structured interview protocol. The interviews explored workers' experiences of delivery work, perceived OSH risks, the role of the app and algorithmic management, company support, equipment, safety practices and possible improvements. The semi-structured format allowed the interviewers to cover comparable topics across interviews while also giving participants space to describe their own experiences in detail.

The protocol was informed by the literature review and by interview protocols developed by project partners. This supported consistency with related project work and allowed for comparison across countries and time points where relevant.

Procedure

The interviews were conducted in person and focused on participants' everyday work experiences, perceived risks and views on company practices. After data collection, the interview material was reviewed and analysed thematically. The analysis involved familiarisation with the interview material, coding relevant segments, grouping codes into themes and refining these themes in relation to the research focus. The final themes reported in the Results section reflect recurring issues in workers' accounts, including organisational support, environmental and equipment-related risks, efficiency pressures, app-based management, company structure and worker characteristics.

RESULTS

The analysis of the six interviews revealed prominent themes that capture participants' perspectives on the interaction between AM, platform work and OSH. The main themes were limited organisational and social support, delivery-related OSH risks, efficiency and risk-taking strategies, company structure, and worker demographics.

For some of the themes, there are clear differentiations between delivery company A and B, or a delivery driver will mention their company themselves. We have highlighted this where necessary throughout the results section. Please refer to the Methods section for the definition of both delivery companies. Additionally, throughout the results we will refer to interviewed delivery workers in various ways, including interviewee, courier, delivery driver, rider.

Organisational support and risk exposure

This theme describes what interviewees said about organisational support, social contact, communication channels and safety-related routines. Participants described clear differences between the two companies, particularly in relation to hubs, direct support, training, equipment use and safety checks.

Two interviewed delivery workers from delivery company A were trainers. They described reminding other workers about safety practices, including helmet use, clean backpacks and vehicle checks. One trainer explained, *"I say 'I see you without a helmet' or something, and I'd say 'why aren't you wearing a helmet'… if I see it again I write a message to the hub." Another stated, "I really take care of my team… if you don't do it, you have a warning [clean backpack]. If you have too many warnings, it's not good for you in the company, so they [other delivery workers] do it."*

Workers from delivery company A also described support from dispatchers and hub coordinators. One interviewee explained, *"The dispatcher is a person who is our support… together with this dispatcher… you find solutions for this problem." Another noted, "If you do not want to do an order you have to give a good reason… together with the driver they will find a solution."* By contrast, delivery workers from delivery company B described company responses as scripted, delayed or not useful. One worker said, *"I reported the order… they then asked support a follow-up question… 20-25 minutes later… we are not getting any more response from you so we are closing it."* Another stated, *"You miss that with [company name], luckily you don't need them often, but if you did, it's of no use to you."*

Several delivery company B workers wanted more direct communication channels. One interviewee asked, *"Maybe, is there a way the drivers could contact [delivery company name]… it takes a long time."* Another explained, *"In the beginning, when I started, they had an option where you could contact them directly. But now this option is gone, it's only for the restaurants."*

Workers from delivery company A described receiving training on equipment, hub rules and basic app use. One trainer explained, *"We tell them the rules about the gear, the rules about the hub… then we show them a bit about the app, not too much, just the basics."* The same trainer described showing new workers examples of how to respond to app updates: *"When I tell them, 'Hey, look at my app,' they can see my tips. I show them examples [of how to adapt to application updates]."*

Interviewees also described the emotional value of support and familiarity. One worker from delivery company A said, *"At some point you feel appreciated as an employee. You're a familiar face, it's like a team."* A worker from delivery company B described the importance of knowing that support is available: *"[…] having decent support, it's a psychological thing, knowing that someone is behind you is just nice."*

Interviewees from delivery company A described the communal hub as a place where workers collect bikes and equipment, meet colleagues, receive support and spend time before, during or after shifts. Delivery company B does not have comparable communal hubs.

Some interviewees linked the presence of a hub to the use of safety equipment. One worker said, *"Always sometimes people don't want to wear the helmets, but it's very little. My feeling is that the cities that don't have the hub use the equipment less. I think because they don't have that culture."* Another added, *"[Location], they don't have hubs. I work in [location] and in [location] and in [location] I see people not wearing their helmet or their jacket. It depends on the city; if they have the hub, they feel the control of the company."*

Interviewees also described the hub as a place where workers are seen by others. One participant said, "I think that the amount of people working, watching, taking care of couriers, you see that they are going to use more of the equipment. If you work from home to the street, you don't have that feeling of being observed or something." Another said, "For this company, I think it's also safety as they have a lot of warnings to do their work around the hub etc."

Workers described the hub as a positive social environment. One said, *"It's a nice place, nice. I'm happy when I go there."* A worker from delivery company B, reflecting on a previous platform with a comparable communal structure, said, *"[Previous delivery platform] had a rider forum, where riders can choose a representative from each city. Four times a year, there was a consultation at the [previous delivery platform] office in [location], where safety issues could be discussed, person to person."*

The hub was also described as a place to build familiarity and experience. One interviewee said, *"But I am a familiar face, I have been working here for a relatively long time and I have a bit more experience, certainly than the other delivery people, with the tasks that take place at the hub itself." Another explained, "At the beginning of your shift, you pick up a bike there anyway. […] At the end of my shift, I'm often there a bit longer. Then you sometimes stick around, maybe eat something. In the breaks, you often eat there."*

Environmental and equipment-related risks

As previously mentioned, delivery work inherently carries certain OSH risks, even without the implementation of AM. From the interviews, the highlighted OSH risk were environmental risks and faulty equipment.

Several interviewees pointed out the significant impact of weather conditions on safety. One delivery worker noted, "The only downside is the weather. When it's raining it's ok. It was one problem one time, when it snowed over ice." Another shared, "Due to traffic situations. When I am stubborn in black ice to still go on the road. Always look a little. Then you slip several times during the day." The variability of risk depending on weather conditions was highlighted by

another interviewee: “It depends on the weather, if it’s good weather outside, I don’t know, it would be 1 or something, but when it’s raining, it can be pretty dangerous,.”

Physical confrontations and accidents were also mentioned. One interviewee recalled, *“I can remember 3 times that there was a physical confrontation. 2x drunk idiot during a festival, 1x someone in traffic. Gave a push. Unfortunately you can’t do much about it.”* Another described an incident, *“One person slipped on a scooter. They had picked up an order and slipped on a bridge because it was slippery. Another person ran into a car.”*

Despite these risks, some interviewees expressed surprise at the relatively low number of incidents. “I am genuinely surprised at how little actually happens. A lot can happen in traffic. And even if I look at not only what I experience, but what other delivery drivers experience in terms of actual incidents, I think it’s all very much not that bad.”

Cyclists’ behavior was also a concern in certain locations. *“But here in [location], it’s definitely the cyclists you have to watch out for. And not just because of the volume of cyclists. But simply also because of the behaviour of the cyclists. That’s what I’m afraid of.”*

Specific issues with certain bike models were also mentioned, especially fatbikes – a certain type of electric bicycle with thick tires. One of the participants indicated that, while people may think the danger of these vehicles resides in their speed or inadequate tyres, their predominant safety risk in traffic lies elsewhere: “The problem with a ‘fatbike’ as far as I’m concerned is, it doesn’t have that much to do with the tyres. Okay, there may be fatbikes with bad tyres in circulation. But the problem is, many fatbikes that only have a rotation sensor. And so that means that if you try to cycle away at an intersection, at the beginning you are stationary and have no rotation. So then it doesn’t apply any power. Only once you get going yourself, and with a heavy electric bike that takes a while, only then does it start to properly assist.”

Together, these accounts show that weather, traffic conditions, confrontations and vehicle characteristics shape delivery workers’ everyday risk exposure.

Several interviewees pointed out issues with the bikes provided by the company. This was only prevalent for delivery workers working for delivery company A, as delivery company B do not offer any company bikes. One delivery from delivery company A mentioned, *“It was a problem with the new bikes that we have, that are, they go further sometimes along, the bikes have a problem with the brakes.”* Another added, *“I will say that I really don’t like the new bikes we have in the hub. I know that it was a problem we had with the old bikes and they tried to fix it but I think they’re not great bikes, they go by themselves sometimes. If you don’t press the pedals sometimes they go on their own. I think they are a bit old, but that is the only complaint I have.”*

The condition of the bikes was also a concern. *“They bought old bikes from [location] for us to keep working because we have hub drivers, and I think they’re a bit old. The batteries are not perfect. I think you can work with that bike, it’s not the worst, just not convenient.”* Another interviewee shared, *“The first one was a very bad model. Now what we have, it’s kind of between the worst and the best. It’s in the middle, as in technology new, because the bicycle also evolving like that and everything. It’s kind of between the worst and the best.”*

Brake issues were frequently mentioned. *“Anyway, the bicycle that we have now is not the best. The brakes are very bad, not very bad. Again, medium. The brakes on the one that they*

are out now, they were great because we have multiple." Another interviewee noted, *"So I was going 29-30mph on the bad model back, and the brakes were like, very bad."*

The lack of maintenance was also highlighted. "Most people here don't even have working brakes anymore; they're broken. The brakes on electric bikes wear out. It's not really well-checked." Another interviewee expressed frustration with the bike checks, "Then you also have things like the fact that we have to check bikes for our services. And of that.[…] It takes a lot of time and it actually delivers almost nothing. What you actually want to do is check the brakes on a bicycle before you leave. […] And you don't have to spend 15 minutes checking a bike for that."

The challenge of adapting to different bike models was also noted. *"I've gone through maybe seven models of bikes. And those are the really dangerous moments. When you are used to one type of bike and you change, if only for a day to another type. Because then you are used to that other bike."*

These accounts indicate that unreliable or poorly maintained equipment can intensify existing traffic and weather-related risks, particularly when workers must adapt quickly to unfamiliar bike models.

Efficiency pressures and worker adaptations

The interviews suggest that delivery workers develop informal strategies to manage time pressure, equipment changes, app limitations and order allocation. Some adaptations support safer work, while others may increase risk.

Delivery workers often need to get accustomed to different bikes. One interviewee mentioned, *"Obviously the first day, when you go you end up getting used to how the bike works, changing bikes. Maybe it's just because I haven't had a long time with the bikes I don't feel that comfortable with the other ones."*

Some workers adopt competitive strategies to get more orders, even if it compromises safety. An interviewee noted, *"A group of two people is constantly getting orders, and the rest are not. When someone gets an order, they start racing because they need to catch up. They have an advantage over me, so they drive recklessly. Safety isn't really a priority."*

To increase their order volume, some workers use different types of accounts. *"[delivery company B] accepts it, and they can drive or cycle with the [delivery company B] account. They are riding a bike, but they use a scooter account to get more orders,"* one interviewee explained.

Workers also turn to online resources to improve their skills and knowledge. One person mentioned, *"No, I was looking just videos on YouTube myself. Like you have to be aware and prepared, because in the Netherlands bicycles are very popular, even a child, a small child is outside driving a bicycle."*

These examples show that worker adaptations are not only individual choices, but responses to platform design, payment incentives and limited formal support.

The interviews highlighted a distinction between delivery workers who take risks and those who prioritize safety, illustrating different approaches to efficiency.

Some workers consciously avoid taking risks while driving. One interviewee mentioned, *"I think I don't take a lot of risks when I am driving. I try to respect the traffic lights, to use my things (signalling), don't go too fast, go on the bike roads. I really try not to take lots of risks. […] some people take more risks than others."* Another added, *"People[other delivery workers], they can be more careful, and they can be a better example for the others."*

The perceived time savings from risky behaviour are minimal. One delivery worker noted, *"In the end, it doesn't really matter whether you drive through a red light or just wait nicely. If they communicate that. The difference is 1 or 2 minutes at most. Even if you compare normal driving versus reckless driving. Those two minutes really don't make a difference."* However, some workers engage in risky behaviours to increase their order volume. *"People are going crazy, speeding on scooters to get more orders,"* one interviewee observed.

Different strategies are used to manage navigation and phone usage. One worker shared, *"We basically use our own phone. A lot of people use a phone holder for that. I just use it in my pocket these days. While driving, I don't use it either. I just look at the route in the restaurant. Try to remember as much as possible. And then basically at the end of the drive, you're near the customer higher. That you have to look a little bit more while standing still. And that you can then walk to the right door. You can hardly predict the situation of the last 50 metres, so to speak. Because that's where things often don't add up."*

The lack of signalling and awareness among some drivers is a concern. *"But I'm still always amazed when people just wave left and right. Without looking, without extending their hand, without giving way. And sometimes even with a phone in their hand. Then my clog really does break,"* one interviewee expressed.

These contrasting approaches suggest that efficiency pressures can translate into different safety behaviours, depending on workers' incentives, experience and perceived control over the work.

Interviewees described several informal strategies for dealing with app updates, technical problems and unclear order allocation. These adaptations helped workers maintain efficiency, but also show how they were left to manage digital and organisational problems themselves.
Some workers expressed frustration with new updates, feeling they were less effective than previous versions. One interviewee mentioned, *"I have a new update that I think is a bit worse than the old version."* Another interviewee shared that *"The update software was done, but was not that good and tested, and there were a lot of bugs,"*

Navigational issues were a common concern. *"You have to go to Google Maps for the GPS, you have to get out of the app to see the GPS, or when you have double orders, you can't see which of the orders you are going to first, who is the second, so now in the update you can't see it,"* one person explained. Another added, *"You have to go to Google or Apple Maps and it's just a little thing but I think it's easier to just put it in the same app."*

Technical glitches were a source of frustration. *"But the order was in the background. Like, literally, close the app, you open again, and then wow, double order. Frustrating, I guess,"* one person noted. Another mentioned, *"You navigate, but it doesn't correlate the numbers all the time. So for example, I have okay [location] start number 12 in the app. But Google Maps takes number 28."*

Some workers found workarounds for these issues. *"But for some drivers, yeah, they really need to do the airplane mode for, I don't know, half a minute, and then again, airplane mode off. I understand that they were doing some research. Okay, what kind of phone you have, what kind of software we have, yeah, technical stuff. IT stuff. But now it's better, yeah, okay. It still doesn't ring all the time, but the order in the background, it's rarely, and rarely in my phone, at least.*"

Understanding and leveraging the app's algorithms was another challenge that the workers shared amongst one another. *"With friends and fellow delivery people, we often tried to figure out how the algorithms work. How can we use it to our advantage? Complete mystery. At [previous delivery platform] we finally figured it out, at [delivery company B] it is a mystery,"* one interviewee explained.

Perceived unfairness in order distribution was also noted. *"It's getting a bit unfair—scooters get more orders than cyclists in the app,"* one person observed. Another added, *"People are going crazy, speeding on scooters to get more orders."*

Verification processes and rating systems also posed challenges. *"[delivery company B] constantly asks for photos to verify who you are. People who have a scooter account but don't have a scooter just ride a bike. They must re-upload their driver's license. In some cases, people pay about 600 euros for a fake driver's license and use it to register on [delivery company B]," one interviewee shared. Another noted, " [delivery company B] works with a thumbs-up system. Some people give you a thumbs down for no reason, they get grumpy, and then think, 'next time, I'll give a thumbs up.' Someone got a thumbs down because the customer gave the wrong address and got a thumbs down, so their rating goes down. Some people really start speeding to avoid getting a thumbs down. After a few thumbs down, your account gets blocked. A lot of people get demotivated because of that."*

Training videos were also criticized. *"Often it's a video with some questions after. Yes, those videos, that's some kind of AI puppet that articulates strangely and gives fairly pointless tips, in double quotes. I've never seen anything in that and, frankly, I don't think it's of any use to almost anyone or at all. It doesn't make sense,"* one person commented.
These accounts indicate that app design, technical glitches, opaque order allocation and weak digital support can produce frustration and uncertainty, with potential implications for safe decision making.

Company structure and risk management

This theme describes what workers said about payment systems, employment arrangements, equipment provision, helmet use and safety checks across the two companies.

Several interviewees described differences between hourly pay and payment per order. For delivery company A, being paid per hour rather than per ride was described as reducing pressure to rush: *"they [delivery workers] don't have to rush, that they don't have to do more than what is expected."* Following this interview, we found out that delivery workers from this company are expected to complete two deliveries per hour.

When a delivery worker from delivery company A was asked whether they preferred being paid per hour, they responded, *"I think that getting paid per order we would take more risks as you*

would want to make more money so you would be driving faster and people are going to not perfect performance."

Interviewees also described differences in safety mandates. Delivery company A has a mandatory helmet scheme, which one worker described positively: *"using helmets, maybe its my choice and maybe I don't use it, so yea its good that that is mandatory, that I know."* Workers also referred positively to equipment provided by the company: *"they give us the helmet, the jacket and even the gloves in the winter, that's how important, yes they give us everything. I think the equipment they give to us is perfect."*

Delivery company A workers described regular equipment checks. One participant said, *"Yes we have to check if the bikes are suitable for the work when we do the training, we have to check the bike. Don't think [delivery company B] have this."* Delivery company B workers instead described app-based checks. One worker said, *"Yes, they send a notification. You have to pass through the information they give you about the lights on the bicycle and everything else. And after you can start your shift."* Another described identity checks through the app: *"Occasionally, you have to take a photo here [to application] and there to prove it's really you."* Some interviewees said these checks were easy to complete without meaningful inspection. One worker said, *"[delivery company B] conducts a safety test. When you start with a bike, you have to check off some items. It's very simple; I can do it while walking."* Another noted, *"Most people here don't even have working brakes anymore; they're broken. The brakes on electric bikes wear out. It's not really well-checked."*

Demographics

The interviews highlighted certain demographic characteristics of the delivery workers within the two companies. The interviews highlighted how demographics can also be related to the safety of the work. For example, one interviewee noted, *"People come and go in the company, […] people, they come and go right when you come for the job for two months, or for, I don't know, even two weeks, and then you go, maybe you don't care that much about what you do there. We work with mainly young people, students, teenagers. They can work from 16 years old and like that."* This transient nature of the workforce, combined with the youth and inexperience of many workers, can lead to a lack of commitment to safety practices, increasing risks.

Another interviewee mentioned, *"I have some cases, people or girls, coming from countries where you don't cycle that much. […]."* This highlights how cultural differences and lack of cycling experience can impact safety, as some workers may not be familiar with basic cycling skills or traffic rules of the country they are now working in.

"But there are people who didn't cycle since they were eight years old, then they come for the job," another interviewee added, emphasizing how the lack of cycling experience among workers from different countries can affect their ability to perform safely. This underscores the importance of proper training and familiarization with local traffic rules and safety practices.

Furthermore, some interviewees referred to workers with insecure residence or employment situations. As one interviewee pointed out, *"Many undocumented workers work here for [delivery company B] and don't know the rules. For example, they don't give right of way at pedestrian crossings."* Participants linked limited familiarity with Dutch cycling norms and traffic rules to situations that they perceived as unsafe. Company B announced there would be checks

to tackle this issue, but these *"were announced beforehand, so nobody showed up"*, to the annoyance of the other platform workers.

The interviews revealed that *"those are the people who are more likely to take risks and have accidents. That's their life, their entire income."* This underscores the precarious nature of the job for many workers, who as this job being their main source of income, may feel pressured to take risks to complete deliveries quickly, thereby compromising their safety.

Several technological and organisational interventions could address these risks, including stronger safety feedback, adaptive workload management, clearer communication channels and more consistent organisational support. As this chapter focuses on identifying OSH risks, these potential solutions are discussed separately in Part 3.

DISCUSSION

This chapter examined how delivery workers in the Netherlands experience OSH risks in platform-based delivery work, and how these risks are shaped by AM and company organisation. The interviews suggest that many of the risks workers described are not entirely new: traffic exposure, adverse weather, faulty equipment, customer interactions and physical strain are already part of delivery work. However, the findings indicate that platform organisation and AM can intensify these risks by shaping how work is allocated, monitored, supported and incentivised.

The main contribution of this chapter is therefore to show how organisational arrangements mediate the relationship between AM and OSH. The contrast between the two delivery companies is central here. Delivery company A combined app-based coordination with hourly pay, equipment provision, physical hubs and more direct support. Delivery company B relied more strongly on self-employment arrangements, piece-rate pay, worker-provided equipment, app-based checks and remote communication. These differences suggest that AM should not be assessed in isolation from the organisational systems in which it is embedded.

From an organisational risk-management perspective, hubs appear to function as more than logistical spaces. In delivery company A, the hub supported equipment distribution, bike checks, informal supervision, training, peer contact and direct access to colleagues or coordinators. These functions can be understood as organisational controls that make safety practices more visible and easier to reinforce. By contrast, the absence of a comparable hub structure in delivery company B meant that workers depended more heavily on app-based communication and individual judgement. This difference matters because platform work is often associated with social isolation and limited collective support (Graham, Hjorth, & Lehdonvirta, 2017; Berástegui, 2021). The findings suggest that physical or otherwise structured support spaces may help reduce some of these risks by creating opportunities for feedback, social connection and safety reinforcement.

The findings also show that support channels are important risk-management mechanisms. Where workers could contact dispatchers or hub coordinators directly, support was described as more responsive and problem-solving oriented. Where support was mainly app-based, workers described delays, scripted responses and limited usefulness. This distinction is relevant for OSH because delivery workers often make safety-related decisions in real time, for example when facing unsafe routes, difficult customers, equipment problems or adverse weather. In such situations, delayed or ineffective communication can leave workers to manage

risks alone. Organisational risk management therefore requires not only digital coordination, but also accessible escalation routes and timely human support.

Safety checks and equipment provision are another key area where organisational arrangements shape risk. Company-provided bikes and protective equipment can support safer work, but only if they are reliable, well maintained and accompanied by meaningful inspection routines. The interviews showed that faulty brakes, unfamiliar bike models and poorly maintained equipment can intensify existing traffic and weather-related risks. At the same time, app-based safety checks were described as easy to complete without actual inspection. This suggests that digital safety protocols may be insufficient when they are not connected to practical enforcement, maintenance systems or opportunities for workers to report and resolve equipment problems.

For workers who provide their own bikes, organisational responsibility becomes less direct but not irrelevant. If platforms rely on workers' own equipment, they still influence risk through access requirements, safety instructions, app-based checks, delivery expectations and payment systems. A lack of effective equipment oversight may therefore shift responsibility onto workers without necessarily reducing the underlying OSH risk. This is especially important in platform models where formal employment protections and routine supervision are limited.

Efficiency strategies

Payment systems and performance incentives also need to be understood as part of organisational risk management. The results suggest that hourly pay may reduce pressure to rush, while piece-rate pay can encourage workers to maximise order volume. This does not mean that all workers paid per order will take risks, but it indicates that payment design can create incentives that make risky behaviour more likely, especially when workers depend on delivery income or compete for orders. In this sense, efficiency pressures are not only individual behavioural issues; they are shaped by the platform's organisational and algorithmic design.

Worker adaptations should therefore be interpreted as signals of gaps in formal risk management. Strategies such as racing for orders, using different account types, relying on YouTube for safety learning, troubleshooting app issues independently or trying to infer how order allocation works point to areas where organisational systems may be unclear, weak or misaligned with safe work. These adaptations may help workers cope with the work in the short term, but they can also transfer responsibility for risk control from the organisation to individual workers.

App design and algorithmic transparency are also relevant to organisational risk management. Workers described technical glitches, unclear navigation, opaque order allocation and rating systems as sources of frustration and uncertainty. These issues matter because delivery workers must make rapid decisions in traffic and public space. If the app creates confusion, distracts workers, or gives little explanation for order distribution and penalties, it may indirectly affect safe decision-making. Transparent, usable and responsive digital systems should therefore be treated as part of the OSH infrastructure of platform work, rather than as neutral administrative tools.

Worker characteristics should also be interpreted through an organisational lens. The results included accounts of younger workers, temporary workers, migrants, workers with limited cycling experience and workers facing economic dependency. These characteristics should

not be treated as risk factors in themselves. Rather, they point to the need for accessible training, language-sensitive communication, familiarisation with local traffic rules, and support systems that account for different levels of experience and dependency on the platform. In this way, vulnerability is partly produced or reduced by how the organisation designs work, training and support.

Risk implications and link to later chapters

Overall, the discussion points to a broader conclusion: AM does not determine OSH outcomes on its own. Its effects depend on how algorithmic systems are combined with employment arrangements, communication channels, equipment policies, safety checks, training and support. The interviews suggest that organisational structures can either buffer or amplify the risks associated with platform delivery work. Because this chapter focuses on identifying risk mechanisms, detailed discussion of specific interventions and safety-learning mechanisms is addressed in Parts 3 and 4 of this book.

CONCLUSION

This chapter has shown that delivery workers in the Netherlands face a combination of traditional delivery-related OSH risks and risks that are intensified by platform organisation and AM. Traffic exposure, weather conditions, physical demands, customer interactions, faulty equipment and limited support already make delivery work a high-risk occupation. AM can amplify these risks by increasing work intensity, reducing autonomy, creating uncertainty through opaque task allocation and ratings, and encouraging risk-taking through payment and performance systems.

The comparison between the two delivery companies suggests that organisational arrangements shape how strongly these risks are experienced. Hourly pay, equipment provision, physical hubs and direct support channels may reduce some pressures, while piece-rate pay, self-employment arrangements, limited equipment oversight and weak communication channels may increase exposure to risk. These findings position Dutch delivery work as a clear example of how AM can reshape existing OSH risks rather than simply introduce new ones. Solutions and safety-learning mechanisms are therefore addressed in the following parts of the book, while this chapter contributes to Part 2 by identifying the key risk mechanisms that need to be understood before prevention measures can be developed.

We must consider how algorithms are designed, implemented, and used within specific organisational settings. This means examining how algorithms interact with people and other systems within an organization to better understand their impact on management practices. Todoli-Signes's (2021) paper further highlights the need for algorithms to be accurately programmed, considering occupational risks, similar to how supervisors need training in risk prevention to carry out their tasks effectively.

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7 Effects of Platform Work on OSH – Norwegian Case

The Effects of Platform-Mediated-Work on the Occupational Health, Safety and Wellbeing of Delivery Workers – Norwegian Case

Ivonne Herrera, Trond Kongsvik & Marie Nilsen

***Abstract*—**Platform-mediated work (PMW) is rapidly growing with limited research within occupational safety and health (OSH). This chapter builds on the work of Nilsen [1] who explored the impact of PMW on worker health, safety, and well-being (HSW) through diverse safety perspectives. It investigates food delivery and analyses platform features influencing OHSW outcomes. Utilizing the Job Demands-Resources model, the research analyses data from 26 interviews. The findings reveal three interlinked crucial factors shaping job demands and resources in PMW: platform fluidity, loose labour coupling and individual characteristics. By unpacking these complexities, the chapter proposes strategies for aligning PMW with principles of sustainable work.

***Keywords*—** Platform work, Gig, Algorithmic management, Occupational, Health, Safety and Well-being, Sustainability, Job demands and resources.

INTRODUCTION

The digital transition provides opportunities to develop new business models and the shaping of new global markets. Platform-mediated work (PMW) refers to work where a digital platform matches client demand and supply of labour in exchange for payment from Eurofound [2]. This kind of work has become extremely popular, offering both personal services (such as deliveries of goods, cleaning or care services) and online services (such as data coding, graphic design or translation). Platform mediated work continues to expand and is expected to reach 43 million people in Europe by 2025 (European council, 2025 rules on platform work, Consilium website[3]).

Platform-mediated work (PMW) spans a wide spectrum—from low-skilled, short-term tasks like image tagging and survey responses that take minutes or hours, to highly skilled professional services such as software development or therapy, which can last from days to years [3-4]. Digital platforms are transforming traditional employment by breaking work into discrete tasks and shifting the employer-employee model into more complex arrangements. These often involve triangular [5] or multi-sided [6] relationships between the worker/contractor, the

[3] https://www.consilium.europa.eu/en/policies/platform-work-eu/

platform, and the client or third parties. Estimates of how many people engage in PMW vary widely due to inconsistent definitions, methodologies, and limited transparency from platform companies. (see [7]), but according to the OECD [8], approximately 0,5 to 2 % of the total workforce in OECD member countries are involved in PMW. The number of platform workers is predicted to increase as digitalization in society and commerce continues [9].

As a new way of organizing work, involving a considerable and increasing part of the workforce, it is highly relevant to explore the occupational health, safety and wellbeing (OHSW) of workers in this line of work. This chapter explores Platform Mediated Work of food delivery workers in the Norwegian context. It extends beyond the PhD thesis "Health, Safety, and Working Conditions in Platform-Mediated Work: A Multilevel Perspective", by Nilsen [10]. The chapter addresses occupational health, safety and well-being (OHSW), and what effects this new way of organizing work has for OHSW. It focuses on food delivery, as the number of workers employed in this type of platform-mediated work is rapidly growing. The research combines document reviews, and conduction and analysis of qualitative interviews with delivery workers and managers. It identifies individual and organizational working conditions in food delivery and explores how these conditions affect occupational safety, health and well-being.

BACKGROUND

What is platform-mediated work?

Technological advances are constantly changing how we work, and new technology could also disruptively change how work is organized. Platform-mediated work shows how the traditional hierarchical and co-located organization is being phased out and replaced by digital platforms accessed through smart phone apps. For example, a food delivery worker is usually required to have a smart phone and to install an app provided by the platform owner. Through the app, the workers sign in and make themselves available for deliveries, receive requests for making deliveries and pickup information after acceptance, verify pickup and confirms delivery [6]. The work can be performed with very limited or no direct contact with platform representatives or direct management supervision [11].

Algorithmic management (AM) has been described as how human jobs are assigned, optimized, and evaluated through algorithms and tracked data" [12]. The apps have built-in algorithms that register data on how the work is performed and these data could be used for different control purposes. Data could be location, time of work, rate of acceptance of deliveries, time spent on deliveries, frequency of deliveries etc. This provides the basis for allocation of new delivery request, worker compensation, and other types of rewards or sanctions.

Possible OHSW consequences of platform mediated work

Researchers have raised considerable concern related to the possible consequences of AM for worker safety, health, and well-being. Studies have illustrated that AM fosters a competitive environment and increase performance demands and emotional labour [13]. There is a potential to rank workers according to work effort and apply ranking for rewards, e.g. allocation of attractive shifts. Working speed could thus influence income both directly and indirectly. Also, the evaluation from customers could be used for ranking and rewards but also sanctions and in some cases also discontinuation of contracts. All in all, algorithmic control features affect the distribution of work and intensify work [14].

The concept of algorithmic authority highlights the performance pressures arising from the control mechanisms embedded in technology. The algorithms can be easily adjusted to add or remove features that impact the local working conditions in PMW. According to Nielsen, AM can lead to goal conflicts between efficiency, workload and safety for the individual worker. The demand for efficient work in a constantly evolving environment, governed by standardized instructions, can drive individuals closer to the safety boundary [6].

In the study that this chapter builds on (Nilsen & Kongsvik's work from 2023 [1]), a Job Demands-Resources (JD-R) perspective was used as a theoretical starting point (Bakker & Demerouti, 2018)[15]. The perspective has been used to analyse how work factors can influence workers' HSW. An unbalance between demands (work aspects that require physical/mental effort, e.g. time pressure, physical/cognitive loads) and resources (work aspects that increase motivation and engagement, e.g. social support, autonomy) could lead to burnout, negative health problems and unsafe behaviour [16]. Personal resources and contextual contingencies can influence the associations in the JD-R model. The study set out to identify food delivery specific JD-R factors influencing HSW (See Table 6).

METHOD

The case of food delivery and selected approach

The case study addresses platform mediated work of food delivery in Norway through the lived experiences and perspectives of the workers themselves. To comprehensively understand this complex work phenomenon, an explorative and qualitative research strategy was adapted. This methodological approach allows in-depth understanding of the people involved from their own perspectives as they make sense of the environment [17]. The strategy was operationalized through a carefully designed semi structured interview protocol with open-ended questions, intentionally designed to encourage workers to discuss issues they considered essential in describing their experiences, challenges in platform-mediated work (See Appendix A for protocol details). The discussion encompassed a wide range of issues, including their motivation for joining, the platform features, the work process, relations with the company and other workers on the platform, working conditions, and health, safety and well-being.

Delivery worker participants and interview process

Template analysis was used to examine interview data (26 interviews with managers and workers, see Table 5 for template details). The template is based on extant Job Demand-Resources (JD-R) studies [18-19] adapted to PMW. The JD-R model is an analytical framework for understanding worker well-being and performance. The model proposes that job demands such as workload and emotional pressure can lead to stress and burnout when not balanced with sufficient resources [18]. In addition, sufficient job resources can buffer negative effects of job demands, promoting engagement and reducing work-related stress. These studies together remark the JD-R model usefulness in identifying factors that influence occupational health and motivation across diverse work contexts. Two authors validated the template. Interview data included 26 food delivery workers, and 2 management representatives. First contact was achieved through social media (LinkedIn and Facebook), face-to-face conversations near restaurants and snowballing [20]. The participants gave explicit consent before the interview audio recording, which lasted between 45 to 75 minutes. The audio files were subsequently converted into transcripts. practical considerations, sufficient data to cover the topics related to various aspects of PMW (the organization, work process, technology (app), working conditions,

and individual experiences of PMW), and saturation [21]. Concerning privacy, security and ethics the Norwegian Center for Research Data (NSD) guidelines were followed.

Table 5 Overview of courier workers involved in the case study.

Platform	Total	Male	< 35 years	Main income	Student	Employee	Migrant	< high school	< 20 hours
Courier	26	24	18	10	15	18	14	19	13

Data analysis

The transcribed interviews were imported to a software tool (NVivo version 1.6.2) for data analysis. A technique called template analysis was implemented to identify factors and patterns related to demands, resources, and patterns related to health, safety, and well-being in PMW. This approach is flexible due to it allows comparison of perspectives within a specific context (see Cassell and Symon [22]). The template analysis started with a list of codes based on Job Demands-Resources (JD-R) models (e.g., job crafting, social support from colleagues or management) combined with interview questions. Codes were refined as the analyses progresses adding new themes and creating a final template [22]. Table 6 illustrates broader categories associated to PMW workers. Then, methodological triangulation [23] was applied combining results from template analysis and community observation to strength the validity of the findings. Finally, one author conducted initial coding, and another author reviewed and validated.

Table 6 Analytical categories for job demands, resources, contingencies and HSW outcomes (Nilsen et al.)

Categories	**Description**
Demands	
Physical risks	Ambient risks/physical working environment, posture-related risks
Cognitive load	Complex problem solving and knowledge application
Performance demands	Work intensity (speed, deadlines), extensity (work hours, periods) client relation
Material demands	Required tools and equipment by the PMW
Resources	
Autonomy	Control over how task is performed, control over working hours
Social support	Collegial interactions, sense of belonging, supervisor feedback/communication
Professional development	Opportunity for career progression, skill development, training
Contingencies	
Personal	Motivation for PMW, adaptive capacity, employability
Contextual	External conditions to the PMW (national regulation, work traditions, market
HSW outcomes	
PMW experience	Work satisfaction, engagement, perceived benefits, overall experience of PMW
HSW issues	Other health and well-being information resulting from PMW

RESULTS AND DISCUSSION

The analysis revealed prominent themes that encapsulate the participants perspectives on the OSHW risk associated with PMW. Table 7 illustrates all main themes that emerged related to demands were physical risks, cognitive loads, performance demands, material demands and related to resources were related to autonomy, social support and professional development.

Table 7 Demand and resources in PMW supported by interview statements (from Nilsen and Kongsvik, 2023)

Demands	
Physical risks	Traffic, weather conditions, heavy lifting, alone work, customer interaction "I wouldn't recommend it for a permanent job or employment. It is a very physical job. You cannot work 8 hours a day. You will be tired, pain…" (Delivery employee 11, student)
Cognitive load	Low cognitive demands, algorithmic defined process *"A normal working day is routine, it is basically biking and finding the right direction. It is often a bit boring... There are also a lot of waiting times at restaurants"*. (Delivery employee 9, student)
Performance demands	Emotional labor, work intensity and extensity *"I do feel like if there is a push to go faster, then it comes from me."* (Delivery employee 7, student)
Material demands	Provide and maintain own tools such as vehicle, mobile phone, subscription "We have to purchase our bike and clothing accessories to do the job (which feels like a scam), which can easily exceed 10 000 KR. […] We are told to deliver long distances, which basically means more work, less pay. Yes, I hate this job at times, but being an immigrant, I feel my options are limited [...] I feel stuck in this job." (Delivery employee 14, main income)
Resources	
Autonomy	Terms of services, task distribution, unilateral determined workflow. *"The job is being sold to us as being flexible, but now the company has taken away the shift swap request […] you used to be able to ask managers to swap your shift to somebody else […] they have closed the shift swap channel."*
Social support	Limited to emails, logistical support, social support outside platform. *"[…] in the long term, it is not a nice feeling […] there is not enough communication in the normal human way from the management."* (Delivery employee 17, main income)
Professional development	Limited training, carrier and development opportunities. *"For courier worker 2–3-hour introductory course, where traffic safety is briefly covered"*

The study suggests an imbalance between high demands and relatively low resources in courier work, which can negatively affect worker occupational safety, health and well-being. Even if the cognitive demands are low, food delivery is physically demanding, it involves time pressure in certain periods, and it also involves some physical demands. At the same time, there are limited resources when it comes to autonomy, as the work is to a large extent is managed by algorithms. Food delivery is also performed alone, and with limited social support.

The possibilities for career development are also practically non-existent. This imbalance between demands and resources manifests for some in ways like neglecting personal safety (e.g. not wearing helmets) or taking shortcuts to increase earnings.

The food delivery workers in the study are heterogenous and have different backgrounds and motivation for performing the work. For students, it is easy and flexible, and could be combined with other obligations. They join for shorter or longer periods of time, but they have other options, especially in the longer run. Some are also bicycle enthusiasts and consider the work as training. Another prominent group is immigrants and refugees, sometimes with poor Scandinavian language skills, and few options for alternative work.

Partly in line with this, the study shows individual variations in terms of positive and negative experiences with PMW. The interviews data shows that personal and contextual factors mediate the different experiences. Schaufeli and Taris [16] differentiate between job resources and individual resources (individual qualities). Individual resources, such as optimism, can help buffer the stress of job demands, whereas workaholism, an individual vulnerability factor, can increase burn out [16]. Contextual factors like labour market and a social welfare system [24], also appear to affect worker experiences, particularly for foreign workers who perceive Norway as having better conditions than their home country

The analysis also identified shows two additional PMW-features influencing working conditions beyond demands and resources. These features are labour coupling and platform changeability. Labour coupling refers to social and formal connections between workers facilitated by the platforms, technology. The currier workers' lack a common physical location or direct supervision (due to algorithms management) weakens these couplings (also see Kovalainen et al., [25]). This negatively impacts courier workers limiting communication and hindering effective management. Standardized work (like food delivery) ensures worker replaceability, allowing platforms to maintain access to a flexible workforce. Platform changeability refers to the ability of the platform technology to be easily updated. For example, a single update can significantly change work processes.

In summary, positive OSHW are achieved by work characteristics providing adequate resources to meet job demands. The case study highlights the potential to improve working conditions by utilizing features such as platform changeability and labour coupling to increase resources and reduce job demands.

Limitations: This empirical study draw on interviews to explore work features influences on health, safety and wellbeing of PMW. While the authors acknowledge that the Job-Demands-Resources (JD-R) models has primarily been applied in surveys and quantitative studies. This case enabled identification of the unique PMW features that impact job demands and resources. The authors recognize the need the need for further studies to support these findings. The intricate pathways between the job demands, resources, and HSW outcomes are beyond the scope of this study. Finally, to manage research limitations, the study focus on positive and negative experiences as well as HSW issues that are specific to the case (e.g., traffic accidents). Potential sources of bias include participant selection based on accessibility and the use of second language for communication.

CONCLUSIONS

The research work leverages literature and methodological approaches for collecting worker experiences to identify important factors that influence OHSW. It investigates how platform features influence worker OHSW in food delivery, a sector characterised by a varied workforce with various levels of vulnerability, including students and immigrant workers. The study shows that analysing data in a JD-R provides a systematic, transparent, robust and evidence based approach to understanding worker OHSW. The inclusion of demands (physical, cognitive, and psychosocial) together with resources (social support, autonomy, material resources, and skill and career development opportunities) supported with interviews and testimonials aligns with findings from JD-R demonstrating how balance between demands and resources influences both stress and engagement. Furthermore, the integration of personal resources and contextual conditions as moderators acknowledges the complex interplay with the platform that shapes individual negative OSHW outcomes. These moderators are essential for identifying why workers are vulnerable to OHSW outcomes. Moreover, additional critical features impacting OSHW are related to unique aspects of platform work fluidity (frequent changes and access to work) and loose labour coupling (weak ties between workers and organisations). These features can introduce novel forms that can negatively affect the balance between job demands and resources and potentially impact workers and may be not captured by traditional job models. The research emphasizes the importance of combining demands, resources, platform fluidity and loose labour coupling to promote sustainable and balanced OSHW working conditions in platform mediated work.

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APPENDIX A - PROTOCOL

Prior to asking any questions, to consider GDPR, security and ethics requirements, the interviewee is asked to consent being recorded, to sign and date the informed consent, and to identify themselves.

Introduction

This section targets to establish background of the worker including their education, work experience, any activity outside the platform work. It also explores primary income sources, duration of their work with the platform. It is important to understand their motivation for joining the platform work as well as their perceptions on the differences between platform work and “traditional” employment.

Deconstruction of platform work and workers

This part investigates the distinctions between freelancers and platform employees. It maps demographics factors such as age, gender, nationality. It explores the type of contracts offered (employee status, percentage-based, yearly renewal or open-ended). It also covers if riders utilize other platforms. It examines work processes including, sign-up procedures, criteria for acceptance, training, the choice between freelancing and employee status, a typical shift with details on the work and average deliveries per hour. This part concludes with a discussion on the rider turnover rate, exploring its underlying reasons.

Dynamics of platform work

Way of working: This segment examines what workers consider parts of their work, including unpaid tasks like preparation, waiting times, and customer service. It follows the work description, assessing its variety, challenges, customer interactions, relation with difficult customers, and sufficiency of work hours. The possibility to reject requests is also explored.

Technology and performance: This part asks about workers' knowledge of the information collected about them via the platform. The rating or evaluation system in Platform X is examined, focusing on how worker performance is measured. It investigates if workers have access to an overview of their earnings through the ap. It also investigates the allocation of shifts or requests and if this process differs for freelancers and employees. It follows a question about communication protocols, including when and what information is received, especially if there is a problem. Finally, the nature of feedback is explored and whether feedback is received regarding performance from the app or company.

Incentives and Sanctions: This section maps the presence of incentives (with examples) and sanctions (e.g., for rejecting requests, no helmet/light/PPE, or being late).

Working Conditions, Health, Safety and Wellbeing

This section addresses the responsibility for working conditions and safety, including specific considerations during the COVID-19 pandemic. It investigates if the platform has a reporting system for accidents or near-accidents, and whether workers have utilized it. The communication regarding health and safety from the platform is explored. Mapping of the most common safety and health issues for workers on Platform X, including phone use while cycling

and constant messaging, and discussions on their health, health issues and mental well-being. It covers measures that have implemented to address these issues will be reviewed. It determines who is responsible for equipment maintenance and damage. Workers' suggestions for improving health, safety, and working conditions are collected, distinguishing between freelancers and employees. The conditions for "deactivation" as a freelancer will be clarified.
This part explores workers' feelings about supervision/surveillance through the app and their overall sentiment about working for Platform X (e.g., pride, stigmatization). It also investigates strategies riders employ to circumvent strict or frustrating app requirements. The extent of interaction and social events among riders is examined. In addition, inquiries about workers' future plans for working with Platform and their perceived work-life balance. Finally, this part includes a discussion on union membership among workers, including typical member characteristics and workers' thoughts on strikes. Workers' perspectives on flexibility, autonomy and being their own boss are also explored.

Regulations

This part focuses on workers' knowledge on their rights as employees or freelancers. It collects their opinions about the regulation on work and working conditions in Norway (compared to other countries, if the worker is migrant).

Broader perspectives

The concluding sections offers opportunity to reflect on the concept of “sharing economy” summarizing overall experience as worker in the platform economy. It also provides opportunity to raise other topics not covered in the preceding discussions.

8 Causes of Risks on Food Delivery Platforms in Finland

Causes of Risks on Food Delivery Platforms in Finland

Laura Seppänen

Abstract— The aim of this chapter is to describe those algorithmic operations and practices that are likely to produce or accentuate OSH risks for food delivery workers in Finland. The findings show that although the risks especially in traffic are recognized, promotion of occupational safety is very little present in platforms' operations with couriers. It is suggested that this is partly due to platform companies' reaction to Finnish regulative pressure to turn to employment contracts with couriers: platform companies have modified their operations to avoid practices typical to employers. Every online labour platform, even within the same sector and with similar business models, is unique in its operational details, affecting OSH risks in different ways.

Keywords— OSH risks, algorithmic management, platform work, economic models, food delivery, piece-rate payment model.

INTRODUCTION

The effects of new technologies for OSH remain open-ended, which highlights the importance of investigating how particular technologies are used in practice in specific cases (Oppegaard et.al., 2024).

In Finland, legislative questions about platform work were raised into public discussion in 2020, when the Finnish Labor Council, operating under the Ministry of Economic Affairs and Employment, set out in its non-legally binding statement that it regards couriers of food delivery platforms as employees. According to the council, employment criteria were fulfilled, and the workers had been misclassified as entrepreneurs (TEM, 2015). Important aspect in this decision was whether work was done under the employer's direction and supervision and whether the characteristics of direction were fulfilled in terms of the labour platforms' control schemes towards platform workers (Mattila, 2020). The Labor Council statement fuelled public discussions about the legal classifications and well-being of food deliverers (Sibakov, 2021; Immonen, 2024).

Many court cases around Europe have taken place about food delivery workers' classification with varied outcomes. Court cases are going on also in Finland. The EU's directive about improving working conditions of platform workers (see Part I in this book) will be nationally applied within the following two years. Our data reveals the actual or near-past situation where no such regulation takes place yet.

Data and methods

The data for this work consists of seven interviews of food delivery workers (also known as couriers or riders) that all have a freelancer contract with either platform A, platform B, or both. The are the same companies as discussed in Chapter 12 in this volume. The main piece of data is an interview of a founder-manager of platform B. Previous publications from the same or larger sets of data have also been used (Alasoini et.al., 2023; Immonen, 2024; Immonen & Seppänen 2025; Seppänen et al, 2018, 2022, 2024)) as well as newspaper articles about food delivery platforms in Finland and the food delivery companies' webpages and other publicly available materials.
Sigurd Oppegaard and co-authors (2024) categorise OSH risk in digitalized work environments as isolation, deskilling, worker turnover, piece-rate precarity, reduced worker autonomy, control and surveillance at work, and increased fragmentation. These are used as analytical lenses in interpreting the data.

Two food delivery platforms and their histories

Platform A, an international company, started its operations in Finland in 2015. At first, it hired couriers as employees and had specific meeting spaces and team leaders for couriers. During this time, the company was really a work community for couriers (Seppänen et.al., 2018). But soon, couriers' employment contracts were turned into freelancer contracts, and the dispatcher services that helped couriers in their work were partly automated and moved out of Finland. Later, the meeting spaces were taken away and in 2020, the teams and team leaders supporting couriers were removed. This coincided with the public discussion after the Finnish Labour Council's statement (TEM, 2015). One of the interviewed couriers assumes that the platform removed teams and team leaders for the purpose of avoiding been seen as an employer.

Platform B has never been a community for couriers. As told by a manager, [Platform B] does not offer any forum for couriers because, also that could look like an employment relation. Its history is also different from platform A: it first started in 2014 as a Finnish small startup. It was able to grow rapidly because, due to its innovative and energetic founders, it obtained great amounts of funding from investors. In 2021, company B was sold to a similar US company with a highest price ever sold in Finland. With this trade, the company B became visible as a business hero. Platform B is somewhat bigger than platform A in terms of number of couriers. Both companies have invested in retail with their own grocery stores and delivery, and they operate in many countries across Europe. They both determine the compensation for couriers, make the matching between tasks and workers, and use predominantly piece-rate payments by completed orders, including some compensation per travelled kilometres.

Piece rate model in food delivery

This is how the manager of platform B justifies the piece-rate model:
The big thing is that in the entrepreneurial model, *you pay by per gig. For instance, you start to work for me as a courier. When you are paid per gig, you have an interest in doing gigs, because if you don't, you won't get compensation. (…) In the entrepreneurial model, me and you have the same interest. I as a platform representative want that food is picked when it is warm and the customer gets it quickly, and you are interested in picking and taking the food quickly, because you earn more.*

Other reasons told by the manager are that while couriers are spatially dispersed and on their own without close supervision, piece rate model is a way to avoid excessive control system about couriers' time use. From the company's perspective, the hourly compensation makes the need for intense control and surveillance.

Working time and ranking systems: risk of high workload

Once accepted to the platform, couriers on platform A first need to book work shifts in the platform application. 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. A courier keystrokes into the app both pick up and drop of 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. In principle, couriers 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; Berástegui, 2021).

Platform A scores couriers' performance and places them on certain levels at regular two-week intervals, according to which they can choose their forthcoming work shifts. Couriers can only do delivery work if they have reserved work shifts. Performance measures affecting the score are number of deliveries per hour, no-shows or being late to their shift, number of work hours, and other minor factors. The number of deliveries per hour as a criterium directs couriers to be as fast and efficient as possible which enhances physical load and stress and thus risks. But on the other hand, platform A's shift system may hinder couriers from being able to overwork dangerously long hours, as told by a courier.

The better a courier's performance scores, the better their position to reserve working shifts. Therefore, scores and ranking heavily affect a courier's autonomy and agency in terms of access to work and earnings. Those with best ranking can first choose many and the best shifts, and thus they not only can access gigs and income but also maintain their good ranking in the future. The couriers in the lowest ranking levels face uncertainty: they may be left with few or no shifts, and they must continuously follow-up if free shifts are offered in the swapping system of the app. This continuous follow-up may affect their work-life balance.

The system of working time is different on platform B. No ranking system or work shifts take place anymore. Couriers can all the time see and follow the demand situation for tasks on their apps. They can also log in and off whenever they like. This means that equally to couriers in the lowest ranking levels of platform A, couriers on platform B need to constantly be alert with the demand situation as shown in the app, affecting work-life balance. Since they are paid by gigs, they also adjust their work schedules to demand, often having to work unsocial and long hours to make a living. The criteria for allocating tasks are 1) their location and distance to the restaurant in question, 2) vehicle (bicycle or car, and car size for transporting large items). Couriers' performance, according to company B, does not affect task allocation. The manager explains the reasons behind this strategy:

In a way, originally we thought that couriers are our subcontractors and we are their clients, so we thought that we can have some ranking (of couriers). But later we stated let's not do it at

all. In a way it is not equitable, so it is most clear and probably most safe so that people don't consider it some sort of employment relation ranking, management and control.

These practices mean that couriers can also work slowly or short times, but they are also free to work as much and as quick as they like. *"You can influence your own amount of work, if you bill 500 or 5000 euros per month"*. Platform B relies on couriers' own initiative and voluntariness to be efficient. Platform B's practice of not limiting couriers' working hours enhances their autonomy but does not hinder couriers' working time in any way. Thus, it is a risk for health and safety for those who want or must work long days. The excerpt also shows that platform B attempts to treat couriers equally and to avoid "ranking of an employment relation", management and control.

Maintaining the balance on the platform market: risks of competition and lack of tasks

Basically, the digital platform is a marketplace where the workers meet the jobs. The demand for deliveries and thus for couriers varies in each moment. Because of the promised freedom and flexibility, both platforms may recruit more couriers than what they need. This is probably because the food delivery market has been, and still is, growing during the last ten years. If the demand is good, couriers can have a lot of work and income. If the number of couriers is high as compared to demand, there is less gigs and less income per courier. Couriers then, in the context of piece-rate compensations, will have to compete for gigs with each other. They may have to wait without income. The platform company does not have to terminate the courier contracts: some couriers just stop delivering if they get too little tasks, or if they find better alternatives for work. The intake of new couriers is a common mechanism for platforms to balance the market situation. Platforms dynamically change their algorithms to better fit their business and other goals.

There are thousands of candidates in the queue who want to become food delivery couriers. There is low threshold for acceptance but people may need to wait for months to start, because platforms do not want that the labour market imbalance would decrease couriers' income level. Despite this, couriers have made demonstrations against a platform B due to excessive number of couriers in relation to demand, which has caused drop of income. This shows that maintaining the platform market in balance is not easy.

Platform A 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.

Opacity as a stress risk

An important question is how a platform allows transparency for couriers – and with what outcomes. In Finland, all food delivery couriers are self-employed (independent contractors), which implies that there is an expectation of freedom and possibility of making informed choices in their work. Platforms have a lot of power in deciding, what and how much information about their algorithmic operations they reveal to couriers. For instance, seeing and knowing how tasks are allocated to them would enable couriers to improve their tactics for selecting their locations and tasks. This would increase their autonomy and agency that may improve OSH.

According to the courier interviews, the algorithmic operations such as task allocation often remain opaque to couriers. One of them said (see also Seppänen, 2024):

> *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.*

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 and choose better locations.

The platform A enables the couriers to see and understand the performance criteria that are the basis for their scores, ranking and work shift distribution. However, couriers cannot see how many couriers there are at each ranking level. A courier riding bicycle 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 a 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 for those couriers who are dependent on platform income. This is also the reason why couriers who need income so eagerly and voluntarily work quickly and long hours, causing fatigue and risks to their health and safety.

Algorithmic management operates through mechanisms that often are experienced as opaque from the perspective of workers who have limited opportunities to discuss or dispute the platforms' decisions (Oppegaard et.al., 2024; Seppänen, 2024). This form of control can create a significant stress for workers and should be regarded as an OSH risk factor (Perkiö et.al., 2023; and Berástegui, 2021). According to Gregory (2021), lack of transparency is a key epistemic risk factor in food delivery work, stemming from uncertainty.

Accident prevention, insurances & legal risk

Traffic risks are well known by both couriers and the platform companies. Traffic and other safety issues are taken up and emphasized in the onboarding events for couriers. However, the interviewed couriers mention induction or onboarding and its role in OSH in very short statements, which suggests that safety guidelines and support are not prominent in their platform work environment or they take safety as granted. The learning instances concerning

couriers' safety issues are described and analysed in the chapter 12 in this volume, but otherwise the data does not allow analysis of the contents and impact of food delivery work on safety.

Traffic risks are the major safety concern of the interviewed manager on platform B. The majority of Finnish food delivery couriers are driving cars. In Finland, it is compulsory to have a motor vehicle insurance that covers personal damage as well as property damage to innocent party. In the interview, the manager of platform B says: *The unhappy reality is that (traffic) accidents happen by force. And therefore we offer this voluntary accident insurance and aim at emphasizing traffic safety and in the onboardings we organize, we emphasise that always safety first, always*.

Acknowledging that it is not possible to totally avoid traffic accidents, platform B started in 2021 to offer a voluntary accident insurance to couriers. It is voluntary and free of charge for couriers on platform B. It includes costs for third parties and one-time payments in case of courier injury or death (Manager's interview). Data from a voluntary accident insurance is property of the platform company, but according to company's own information, 500 000 euros of insurance compensations were paid for over 500 damage events internationally (Anonymous report, 2024).

The manager describes the insurance challenge from the company's perspective:
The challenge related to this industry is a bit perverted situation, that companies like us would willingly like to offer more nice things to couriers, more than what we offer now. But it immediately causes legal risk. The problem is that the better insurance we offer, the more we look like employer.
(…) Many kinds of things are used in court against us. This is a sick situation. As a good example is if we would like to offer to couriers an earnings-related insurance component. If you are a bicycle courier, you break your arm in traffic and be out of street (out of work) for three weeks. (…) So we would willingly offer an insurance that protects also against the earnings lost. But now all jurists say that it is too much employment relationship, it cannot be offered because it points to too much legal risk. This is very awkward to us, it is not a cost issue, we could well make the investment, but it is too risky. (…) It is really a special situation, we hope and also lobby for a change to this regulation.

CONCLUSION & DISCUSSION

The findings above show how the dynamically changing operations of food delivery platforms produce or accentuate OSH risks for food delivery workers. Algorithmic management in the geographically scattered work means isolation for workers, especially when no teams or forums take place. The piece-rate model of compensation, in situations where the number of couriers exceeds the number of delivery orders, makes couriers compete with each other, causing stress, uncertainty and decrease of income that affect OSH. The scoring and ranking of couriers by the platform make couriers be efficient and speed up, with potential health and accident risks. And even without scoring and ranking, the piece-rate system increases couriers' need for efficiency and haste. Platforms' excessive intake of couriers diminishes income possibilities and produces stress for the already onboarded couriers. Moreover, the opacity of the algorithmic operations of the platform is an epistemic risk (Gregory, 2021), limiting couriers' learning possibilities and capacity to act in their work.

Platform companies' interpretation of the Finnish societal and regulatory environment 2020-2023 may have, perhaps unintentionally, strengthened that OSH responsibilities have moved more to shoulders of individual food delivery platform workers. We can see the avoidance of being interpreted as employers in removing teams, team leaders and forums that are important supporting couriers' collective well-being and social learning (Le Breton & Galière, 2022) and increasing isolation (Oppegaard et.al, 2024). The actual 2024 regulation, from a platform company's perspective, may prevent platforms to better protect couriers in terms of accident insurances. We see that platforms have developed their operations not to be seen as employers, which has consequences for occupational safety, both indirectly and directly.

However, not all consequences of avoiding the employer role are negative for couriers. For instance, platforms may have paid attention to allowing greater autonomy to couriers in their work. Autonomy and free choice are characteristics of entrepreneurship and the self-employed (Ashan, 2020). Although the labour market imbalance between food delivery demand and the amount of people queuing to become couriers enables companies to benefit from fungibility (Seppänen et.al., 2018; and Van Doorn, 2017) – workers can easily be replaced by new ones with no need to improve working conditions – food delivery platforms still enhance couriers' satisfaction by considering fairness in their working time management systems, asking for feedback about their operations, considering satisfactory compensations or improving transparency for couriers to make more informed choices in their work. Media visibility and pressure from regulatory statements and court cases may have enhanced these positive developments, which will be described in chapter 10 in this volume.

Delivery platforms' response to regulative pressure supports the image of platform work as *institutional chameleons*. In it, "platforms represent a form of work organization whose meaning, nature and impact are not a function of platforms as such but instead reflect the (regulatory) institutional landscape that surrounds them." (Vallas & Schor, 2020). The view of digital labour platforms as institutional chameleons implies that there is nothing inherent in platform work that generates fixed or determined hazards.

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9 Spanish Case – Risks of Delivery Workers in Digital Platforms

Occupational Risks of Delivery Workers in Digital Platforms and Possible Solutions to Safeguard their Safety

José-Javier Larrañeta & Yolanda García Martínez

Abstract — This study is framed within the research project approved by SAF€RA (2022 call) entitled “Occupational safety-related challenges in algorithmic management and solutions for fair work within digital labour platforms.” The research carried out by the PESI team (Spanish Technology Platform on Industrial Safety) has been funded by OSALAN (Basque Institute of Occupational Safety and Health, Basque Government). This study corresponds to the second work package on the occupational risks of delivery workers in digital platforms (WP2: Occupational safety risks for platform workers and potential solutions to safeguard platform workers), with specific references to the case of Spain. The main risks are analysed: physical, organisational, traffic-related, psychosocial, and those related to discrimination or inequality, while proposing adequate preventive measures. Risk management is examined in detail from a gender perspective (women, non-binary people) and for migrant workers. Some best practices in Spain and in other parts of Europe and the world are described. Finally, the study presents the main conclusions and proposes several recommendations addressed to public administrations (labour, prevention, traffic and consumer areas) and digital labour platforms.

Keywords — Platform Work, Spanish Labour regulations, European Directives, Algorithmic Management, Occupational Safety and Health, Risk management, Prevention, Ergonomics, Psychosocial, Road safety, Gender, Migrants.

INTRODUCTION

In recent years, the development of digital technologies has profoundly transformed labour market dynamics. One example of this transformation is the emergence and consolidation of digital delivery platforms such as Glovo, Uber Eats or Just Eat, which have shaped new forms of work organisation, outside traditional labour structures.

These platforms operate through mobile applications that allocate orders, manage routes, evaluate performance, and process payments, all by means of algorithmic systems that function without direct human contact and outside the classic contractual framework between company and worker.

This technical report aims to provide a comprehensive analysis of occupational risks associated with delivery work in digital platforms, with particular attention to their impact on workers' health and safety, considering a gender perspective (and vulnerable groups). The relevance of this study lies in the increasing precariousness, invisibility and fragmentation of this type of employment, which raises urgent challenges in the field of occupational risk prevention(1)(2).

Unlike regulated sectors with clear contractual frameworks, in digital platforms the employment relationship is diffuse. It is often presented as self-employed work, although in practice there are mechanisms of subordination and control typical of a dependent employment relationship. This includes unilateral scheduling, penalties for rejecting orders, constant geolocation, lack of negotiation capacity, and total dependence on the technical functioning of the system. This legal ambiguity hinders the implementation of preventive measures, since neither platforms nor workers have clear structures for representation, consultation, or training in occupational safety and health.

Furthermore, this report is based on the premise that delivery riders are not a homogeneous group. There is high diversity in terms of gender, age, nationality, language, administrative status and level of training, which leads to an unequal distribution of risks and specific barriers to accessing protection mechanisms. Women, for instance, are more exposed to harassment and gender-based violence, while migrant workers face multiple discrimination, precarious legal status, and greater risk of informality (3)(4).

For all these reasons, this technical report seeks to identify the main risk factors associated with the platform work model, describe their impact on the physical and mental health of workers, and propose realistic and applicable preventive measures, both from a technical and regulatory perspective. The approach is framed within the integration of prevention into the very design of digital labour platforms, promoting shared responsibility among stakeholders: digital platforms, public administrations, and the workers themselves.

Methodology and documentary framework

This report has been prepared based on a systematic documentary review of technical, regulatory and statistical sources related to occupational safety and health in the context of platform-based work. In addition, several interviews were conducted with relevant actors in this field (OSH technicians and platform managers). The methodological objective was to integrate the available knowledge from a multidisciplinary perspective, with special attention to the prevention of risks in the specific context of urban food delivery and the workers involved (commonly referred to in Spain as "riders").

The documentary basis consisted of:

- Technical reports prepared by specialized public bodies, such as OSALAN (Basque Institute of Occupational Safety and Health) (1), the INSST (National Institute of Occupational Safety and Health, Government of Spain) (2), and the European Agency for Safety and Health at Work (EU-OSHA) (8) (11).
- Applicable regulations in force (Spain), such as Law 31/1995 on the Prevention of Occupational Risks, Royal Decree 39/1997 on Prevention Services, as well as technical documents associated with the implementation of the Rider Law (Royal Decree-Law 9/2021), the basis of the European Directive (9). This regulation was analysed in detail in

the previous study, first part of this SAF€RA project (Labour Laws on the Employment Relationship and Platform Workers in Spain).
- Sectoral studies focused on the effects of digitalisation on working conditions, including emerging risks such as digital fatigue, algorithmic pressure and organisational precariousness.
- Specific documents on gender equality, cultural diversity, migrant population and the prevention of sexual harassment at work, given the diverse and vulnerable profile of a large part of the delivery workforce. (3) (4) (5) (6) (7)

The method followed was qualitative, descriptive and analytical. Key concepts on physical, organisational, psychosocial and discriminatory risks were extracted, relating them to the particular characteristics of delivery platform work. Based on this analysis, preventive measures have been proposed in line with the principles of action of the Prevention Law, including eliminating the risk at its source, adapting the work to the person, and planning prevention from the organisational design stage.

Likewise, attention has been paid to gender and diversity as a cross-cutting axis. The information gathering specifically considered the different conditions affecting women delivery workers, migrants, young people and workers without formal employment contracts. This approach makes it possible to identify not only the risks, but also the barriers to accessing preventive mechanisms.
Finally, it is necessary to highlight the methodological limitations of the report. The lack of disaggregated statistical data on platform workers, as well as the opacity of the algorithms used by these companies, hinders an accurate quantification of risks. Nevertheless, the convergence of qualitative sources allows for a solid and proactive diagnosis.

Characterization of Work in Digital Platforms

Work on digital delivery platforms, also referred to as work in the platform economy or “gig economy”, represents one of the most significant transformations in the world of work in the last decade. These platforms, such as Glovo, Uber Eats, Deliveroo or Just Eat, operate as technological intermediaries between demand (customers requesting food or other products) and supply (couriers who perform the delivery). Although they present themselves as mere digital tools, in practice they exercise substantive control over the organisation of work, shaping a model that combines elements of self-employment with characteristics typical of salaried employment.

From a preventive (OSH) perspective, this model poses numerous challenges. Couriers have no defined workplace or fixed working hours; they carry out their activity in highly dynamic urban environments, mainly using their own bicycles, motorbikes or e-scooters, and depend entirely on the digital interface to receive orders, routes, instructions and ratings. This form of work is determined by three key elements:

- **Algorithmic control**: Decisions on order allocation, recommended routes, penalties or bonuses are managed by opaque algorithms. This entails a form of indirect but constant labour control, where the worker is pressured to optimise times, maintain a good rating and avoid cancellations, without fully knowing the system’s criteria.
- **Limited autonomy**: Although they are formally considered self-employed workers, in practice couriers are subject to conditions predefined by the platform: service prices, time slots, conditions for joining or leaving the app, among others. This false autonomy hinders

access to traditional labour and preventive rights, such as OSH training, the use of PPE provided by the company, or participation in risk assessments.
- **Fragmentation and isolation**: Work is carried out individually, without direct contact with colleagues, without trade union representation in most cases, and with high staff turnover. This makes it difficult to create support networks, communicate risks or establish formal channels for complaints or improvement of conditions.

In addition, the group of couriers presents notable sociodemographic diversity: in many cities, a substantial proportion is made up of migrant workers, young people without formal contracts, or people in economically vulnerable situations. This heterogeneity implies that risks do not impact homogeneously and that solutions must take into account the intersectional factors present.

In terms of workload, couriers are exposed to intense conditions: high time pressure, prolonged and frequent journeys under adverse weather conditions, absence of regulated breaks, and constant exposure to urban traffic. The nature of income (payment per delivery) encourages performing more deliveries in less time, which **increases road risk and generates both physical and mental overload**.

Finally, it should be noted that, in this labour model, the platforms have positioned themselves in a preventive legal vacuum. Most of these companies do not assume the role of employer, which —in their interpretation— exempts them from carrying out risk assessments, planning prevention, training workers or providing protective equipment. This gap prevents effective application of the preventive action principles defined by current regulations.

Faced with this situation of legal vacuum, the Government of Spain approved Royal Decree-Law 9/2021, known as the *"Rider Law"*, which clearly establishes that couriers working for digital platforms under conditions organised by the company (time control, geolocation, algorithmic evaluation, economic dependence) are employees and, therefore, are covered by ordinary labour regulations, including Law 31/1995 on the Prevention of Occupational Risks.

Labour legislation in Spain associated with risk management in platform work

As indicated in Phase 1 of the present SAF€RA project, Spain has highly developed legislation on occupational risk prevention, mainly through the following Laws and Royal Decrees:
- Law 31/1995 and Law 54/2003 on the Prevention of Occupational Risks.
- Royal Decree 39/1997 on the Regulation of Prevention Services.
- Royal Decree 604/2006 and subsequent amending or supplementary regulations (RD 298/2009 of 6 March; RD 337/2010 of 19 March; RD 899/2015 of 9 October).

To this legislation is added the so-called Rider Law, dedicated exclusively to the rights of couriers working on digital platforms. This is Law 12/2021, of 28 September (repealing the previous Royal Decree-Law 9/2021, of 11 May), amending the consolidated text of the Workers' Statute, approved by Royal Legislative Decree 2/2015 of 23 October, to guarantee the labour rights of persons engaged in delivery in the field of digital platforms.

This Spanish "Rider Law" has been pioneering in Europe and the basis for the European Directive 2024/2831, although the European directive broadens the scope to workers of all types of digital delivery platforms, and not only food couriers (riders), as already detailed in Phase 1 of this SAF€RA study.

Rider Law in Spain

The *"Rider Law"* is aimed at guaranteeing the labour rights of persons engaged in delivery within digital platforms and establishes a series of obligations for companies operating in this sector and employing self-employed couriers in the home delivery sector. These obligations seek to guarantee the safety and labour rights of workers, as well as to promote fair competition in the sector. In Spain, some of the companies affected by this law are Glovo, Just Eat or Uber Eats.

In summary, the Rider Law contemplates:

- The obligation for companies employing self-employed couriers to provide them with **accident and liability insurance**. This insurance must cover the risks arising from the couriers' work.
- The obligation for companies to provide specific **training** to couriers on road safety and traffic regulations. Training must be free of charge and adapted to couriers' needs.
- The obligation for couriers to have access to relevant information about the orders, including the exact delivery address and the amount to be received. This is important for couriers to be able to plan their work efficiently.
- The obligation for companies to inform workers about the **health and safety measures** they must follow to avoid the spread of diseases, such as COVID-19 or other types of pandemics.
- The obligation for companies to carry out a **risk assessment** to ensure couriers' safety at work. This assessment must include risks related to road safety, loading and unloading of goods, and exposure to hazardous substances.

It is important to highlight that the Rider Law also establishes that self-employed couriers have the right to organise and form associations to defend their labour interests. This is an important recognition of the right to trade union freedom and collective bargaining.

In addition, penalties are established for companies that fail to comply with the obligations set by this law. Penalties may reach €6,250, depending on the seriousness of the infringement.

Spain: Prevention Services and OHS management

Proper preventive management in companies, in accordance with the Occupational Risk Prevention Act (Law 31/1995), includes conducting the risk assessment and adopting associated preventive measures. This preventive activity must be duly planned and developed through the corresponding Prevention Service, as defined by Royal Decree 39/1997 (Regulation of Prevention Services). The Prevention Service must cover the four preventive specialties:

- **Occupational Medicine**
- **Occupational Safety**
- **Industrial Hygiene**
- **Ergonomics and Occupational Psychology** (these two areas will become separate specialities in the forthcoming Spanish OHS law currently under development).

For delivery workers on digital labour platforms, the risks and preventive measures span all four specialties (health risks due to outdoor work, load-handling and road accidents, musculoskeletal and psychosocial issues, etc.).
The law provides four modalities for establishing the mandatory Prevention Service:

- Personal assumption by the **employer** (for SMEs in activities not especially hazardous, as listed in Annex I).
- **Designation of one or more workers** (with specific OHS training).
- **In-house Prevention Service** (covering at least two specialities).
- **External Prevention Service (SPA)** to complete the specialities not covered by the modalities adopted by the company.

For digital labour platforms, it appears appropriate for companies to have an **in-house Prevention Service**, which may be complemented by an **External Prevention Service (SPA)**. In any case, they may also **designate certain workers** to support the OHS team. These designated workers are usually **middle managers** who perform coordination and control tasks in company facilities (office, warehouse, workshop, garages), generally different locations from the headquarters where the Prevention Service and its technical team are based.

These middle managers (coordinators or team leaders) assuming additional prevention functions are covered by the **Designated Personnel** definition in the Prevention Service Regulation (**Article 35**), and may perform **basic-level functions**:

35-1. The following functions are included at the basic level of preventive activity:
a) Promote safe behaviours and proper use of work and protective equipment, and foster worker interest and cooperation in integrated preventive action.
b) Promote basic preventive actions (orderliness, cleanliness, signage and general maintenance) and monitor/control them.
c) Perform elementary risk assessments and, where appropriate, establish preventive measures of the same nature consistent with their level of training.
d) Collaborate in the assessment and control of general and specific company risks, by conducting site visits, addressing complaints and suggestions, keeping records, and any similar necessary functions.
e) Act in emergencies and first aid, managing initial interventions.
f) Cooperate with Prevention Services, where applicable.

Although not explicitly specified in the regulation, we consider another potential function of “designated personnel” to be **supporting preventive training actions**, contributing practical examples of real situations and potential risks in the jobs they supervise, while also safeguarding workers’ safety.

To perform the above functions, such designated personnel must have **minimum training** (content specified in **Annex IV** of the Regulation) with a **minimum duration of 30 hours** (40 hours recommended). Many middle managers receive this training from accredited bodies (authorised training centres and **SPAs**) in order to support the company’s Prevention Service.

This is the case for digital platforms such as **Just Eat Spain** (https://www.just-eat.es/) or the **ALSEA** restaurant-chain group (market leader in Spain and LATAM, https://www.alsea.net/), which employ most of their delivery workers and do not rely primarily on self-employment.

These companies appoint certain middle managers (store manager, team coordinator, workshop/warehouse manager) as **designated personnel in OSH**.
To fulfil the functions required of Prevention Services, companies seek to adopt **OSH management models** that can be integrated into corporate quality systems, typically based on ISO standards such as **ISO 9000 and ISO 14000**.

Public bodies in Spain supporting companies and Prevention Services

With regard to Occupational Safety and Health and related information/advisory services for companies and workers, the main actors in Spain are:

- **INSST** (National Institute for Safety and Health at Work, under the Ministry of Labour, Government of Spain).
- **Regional OHS institutes** (under regional governments), including OSALAN (Basque Country).
- **External Prevention Services (SPAs)**, private companies assisting employers with their preventive obligations, whether or not they have in-house Prevention Services. Their functions include risk assessment and prevention planning, health surveillance, risk training and information, emergency management and coordination of preventive activities to ensure a safe working environment and compliance with OHS regulations.
- **Mutual Insurance Societies** (Mutuas) for occupational accidents and diseases: private, non-profit entities collaborating with Social Security, under its supervision. Their main functions include managing occupational accidents and diseases, providing healthcare and financial benefits to affected workers, and developing OHS prevention activities for associated companies. They also manage other benefits, such as temporary incapacity for other causes and cessation of activity for self-employed workers.

All these entities provide various advisory and information services on prevention, in some cases related to digital platform workers and delivery services. The most notable in Spain include:

INSST OHS information services and “Prevencion10” (SMEs and self-employed)

The INSST has long offered an extensive catalogue of studies, manuals and technical guides, as well as training services, aimed at prevention specialists across all company OHS matters.

In addition, the INSST provides an online service to improve OHS prevention and management in **SMEs** and for the **self-employed: Prevencion10** (https://www.prevencion10.es/), open to anyone who registers. Key resources include:

- **Evalua’t**: to carry out one’s own risk assessment.
- **Autopreven-t**: a tool providing technical advice to comply with coordination of **business activities** duties (ensuring OHS when multiple subcontracted companies work concurrently at the same site) and to understand job-specific risks and preventive measures.
- **Instruye-t**: OHS training (30-hour online course) enabling performance of basic-level prevention functions; it also offers various prevention videos.
- **Recommendations for safer work**: manual handling advice, PPE selection/management guidance, information on vehicle blind spots, etc.

Prevencion10 is being recommended by delivery platforms such as **Glovo** for their self-employed couriers, both for risk awareness and OHS training (PPE, road safety, etc.), though it is in fact better suited to **small restaurants** using such platforms. The **self-employed rider** profile is not **specifically covered** in Prevencion10, although there is a **Transport Services** category (covering general and driving risks), which is **insufficient** for rider training.

For small businesses like **bars and restaurants**, Prevencion10 offers an SME profile including a *"delivery personnel"* job. The risk analysis/preventive measures document covers general aspects for premises and jobs (bar, dining room, kitchen, storeroom) plus job-specific risks. For delivery workers it only covers **traffic accidents** (traffic/circulation) and very **basic measures**:

- Manufacturer vehicle servicing and mandatory **"ITV"** (vehicle inspection for cars and motorcycles).
- Compliance with traffic rules and **DGT** recommendations.
- Knowledge of safe riding for motorcycles and bicycles.

However, it **does not explicitly** reference **PPE** use (helmet, jacket, gloves, etc.), weather/traffic conditions, among others. Therefore, the risk assessment and preventive measures are **insufficient** for delivery riders.

Role of Mutual Insurance Societies and External Prevention Services (SPA) in Spanish platforms

Under labour and OHS regulations, company Prevention Services—including those of digital delivery platforms operating in Spain—may rely on approved SPA to complete their preventive work in any of the four specialities:

- Occupational Medicine
- Occupational Safety
- Industrial Hygiene
- Ergonomics and Occupational Psychology

SPA can also design and deliver **training plans** for workers across these areas, even if they only complement the specialities not covered by the in-house Prevention Service. Many SPA offer a broad, **regulation-compliant** prevention training catalogue covering general and road-safety risks, which can be readily adapted to delivery risks. SPAs must be **authorised** by each Autonomous Community (Labour Directorate) based on human resources (with accredited qualifications/competences) and facilities/equipment in each territory to provide the preventive specialities in question.

There is a Ministry of Labour website to consult SPA in each territory and their specialities (**SERPA** – External Prevention Service companies: https://expinterweb.mites.gob.es/serpa/pub/consultas/consultaAcreditaciones ?).

Mutual Insurance Societies (Mutua) also provide awareness and prevention training services, as well as **guides and support materials** for the most frequent risks, accidents and occupational diseases. This reduces accident rates and associated hospital/rehabilitation costs they must cover for companies' employees and for **self-employed** workers (as is currently the case for "official" self-employed riders registered with Social Security). Riders—whether

employees of a platform/logistics firm or self-employed—can turn to the Mutua in the event of accident (general or road) or illness. Platforms must select the Mutua they will work with for their workers and riders.

There are currently **18 registered Mutual Insurance Societies** in Spain collaborating with Social Security (see list: https://aprendered.es/listado-de-mutuas-colaboradoras-con-la-seguridad-social/).

Overview of digital food-delivery platforms in Spain

The main digital food-delivery platforms operating in Spain are **Glovo, Uber Eats and Just Eat**, given that the UK-based **Deliveroo** (with 3,500 riders) left Spain at the end of 2021 after the publication of the Riders' Law. Other, smaller platforms include **GoDelivery, Deliverum and Giongo Delivery**. In 2021 riders were estimated at over **20,000**, and currently (2025) around **30,000**.

Spain also has numerous restaurants, chains and food companies offering home delivery. Many have agreements with platforms, while some also maintain their **own delivery teams**, some employed, but generally self-employed. Large chains with delivery services often use **employees**, in addition to platform agreements—e.g., the **ALSEA Group** (leader in Spain and LATAM, with seven restaurant brands and a network of owned/franchised outlets, https://www.alsea.net/).

Prevention Services in such companies (restaurant/food chains) operate robust **OHS management systems** to drive preventive and training actions. By contrast, **small businesses** usually possess only order-management software, with **no integrated safety/prevention** features for delivery workers. Prevention Service functions are assumed by the **owner** or a **designated responsible person**, which limits preventive capacity; standard administrative support (accounting, tax, labour) is not enough. This is mitigated through **SPA assistance**, a preventive model also used by medium-sized and some large companies (for certain specialities).

Due to the **Riders' Law (2021)** and **Labour Inspectorate** pressure to regularise riders previously acting as "false" self-employed, platform labour models have begun to shift towards a **mixed model** with payroll riders and a reduced number of self-employed, alongside contracts with **last-mile logistics** companies such as **Easy Rider** (https://easyrider.app/) or intermediaries like **Job & Talent** (https://www.jobandtalent.es/). This transition is making it difficult to **quantify** the real number of workers operating as riders (food and other products).

Just Eat Takeaway Spain has had **no problems** with the Riders' Law, as most of its **2,500 riders are employees**, supplemented by fleet providers as needed. Hence PESI's research team engaged with the company in 2024, holding several meetings with management and the Prevention Service (Feb–Apr 2025). The assessment of its labour policy, OHS management model, protocols, training and communications with riders explains why we present Just Eat as an example of **good practice**. Further details of this model are provided in subsequent sections.

Uber Eats is estimated to have around **4,000 riders** in Spain, though there are **no official data**, and it has not been possible to obtain information from public sources.

The case of **Glovo** (part of **Delivery Hero**, Germany) is different: it manages the **largest number of riders**, while also accumulating the **most labour claims** from self-employed riders, even prior to the Riders' Law. Glovo currently has **63,000 active riders monthly** on its app worlwide, **15,000 of whom operate in Spain** across **900 cities**, and nearly **4,000 office employees** worldwide. However, because official self-employed courier accounts in Spain (held by citizens and regularised immigrants) are **rented out to others** (mainly irregular migrants), it is very difficult to assess the total number actually working for the platform. Spain's Social Security has referred to the Labour Inspectorate **data on 60,000 self-employed** who may have worked for Glovo during **2021–2024**, with regularisation potentially requiring **multi-million** Social Security contributions. Despite Glovo's CEO announcing a **labour model change** (contracted riders and support fleets) in **December 2024**, as of late **May 2025** such announcements have **not materialised**, save for statements about the difficulties and costs involved.

The platforms' conduct and relations with delivery workers have generated considerable controversy, leading to numerous media articles and TV reports with interviews of experts, platform managers and riders. For example, Spain's public broadcaster RTVE has produced several pieces, including the documentary "Riders" (RTVE Play: https://www.rtve.es/play/videos/riders-el-documental/), addressing riders' labour issues following the Riders' Law, with interviews across stakeholders.

Platform actions regarding the Riders' Law in Spain

Platforms' stance on the Riders' Law is crucial, as it affects not only riders' employment conditions as employees but also their inclusion in OHS policy and the general prevention plan (training and information on risks). Ultimately, this depends on each platform's OHS strategy and supporting actions (prevention, training), even where riders remain self-employed.

For instance, Deliveroo (UK) (22), which left Spain due to the costs of converting its 3,500 riders to employee status, maintains OHS training services, especially on road risks (Deliveroo Road Safety, https://riders.deliveroo.co.uk/en/road-safety), with guidance for four vehicle types (bicycles, scooters, cars, e-bikes). Since 2022 it has had an agreement with riders' official union GMB, developing a programme on rights and dignity in interactions with the platform and restaurants (GMB x Deliveroo Respect Charter, https://riders.deliveroo.co.uk/en/respectcharter).

Although our OHS assessment of Glovo is not positive, it has implemented some relevant actions:

- Accident insurance: agreement with a Spanish insurer, "Glovo Insurance by Ferrer & Ojeda" (https://glovo.ferrerojeda.com/es-es/). Coverage is limited to "while performing a Glovo service" and includes medical/hospital expenses, compensation for physical injury (fractures, sprains) and temporary incapacity (up to 30 days), and death benefits. It excludes damage to work tools (vehicle—bicycle/scooter—or smartphone).
- "Safe community" with riders: Glovo Spain safety-community (https://delivery.glovoapp.com/es/safety-community/) states principles on inclusion and zero tolerance for violence/sexual abuse/discrimination by nationality or gender, but provides only generic guidance and a survey to report violence—insufficient in our view.
- Emergency SOS button in the rider app for accidents/incidents.

- References denouncing violence against women, though essentially pointing to the SOS button, with a future women's safety protocol under study.

Regarding transport materials (backpack), jackets, PPE or vehicle accessories (bicycle/motorcycle), which the platform does not supply, only guidance is provided, with the option for riders to purchase them via Glovo Store (https://glovostore.com/ES/es/landing-courier)—the opposite of platforms like Just Eat, which provide this equipment free of charge.

OSH management systems

To meet Prevention Service functions, companies seek OSH management models that can be integrated into corporate quality systems (typically ISO 9000 and ISO 14000).
For OSH Management Systems, the most widely adopted international standards in Spain and worldwide are OHSAS 18001 and ISO 45001.

From OHSAS 18001 to ISO 45001: OSH management

OHSAS 18001 (Occupational Health and Safety Assessment Series) is an internationally recognised OSH management system standard. It provides a framework for organisations to control and improve OSH performance, helping identify/manage risks and improve workplace health and safety. It is based on the PDCA cycle (Plan–Do–Check–Act) and aligned with ISO 9001 and ISO 14001. It is applicable to all organisations regardless of size/type/sector and was widely used from 1999 until 2021 (end of recognition). From 2018, OHSAS has been gradually replaced by ISO 45001:2018 (10), though it remains a useful starting point for Prevention Services.

Both standards share common structure and concepts, but there are key differences. ISO 45001 is more closely aligned with other ISO management standards (ISO 9001/14001), has a broader scope (including leadership and worker participation requirements), and places greater emphasis on preventing accidents and diseases, not merely identifying/controlling risks. Overall, ISO 45001 is more comprehensive, offering a more holistic OSH approach and better alignment with other ISO management systems.

The advantage of using these standards is the detailed definition of the company's Prevention Service management model. The resulting documentation contains not only the OSH Policy and Objectives/Programmes, but also the organisation and distribution of roles/responsibilities. It further details essential activities of the Prevention Plan and their scheduling: Risk Assessment, Health Surveillance, and the training/communication plan, completed by the annual OSH plan.

A fundamental aspect of standard-based OSH Management Systems (OHSAS 18001, ISO 45001), expressly specified in the standards, is the planning of training activities on risk prevention and occupational health.

These systems include actions on information, training and communication, especially safety alerts concerning forthcoming or imminent risks to task execution (adverse weather, extreme climate, traffic congestion, emergencies, etc.).

Software tools for OSH Management Systems

To implement OSH Management Systems, Prevention Services rely on software platforms to organise/automate OSH procedures and record preventive actions within the chosen standard model.

In Spain, two domestic providers offer OSH management platforms:

- ESG Innova, with “ISOtools” collection and the “HSEtool” module that cover OSH procedures (https://hse.software/); ESG systems are very popular in LATAM countries.
- Prodity Software, with a powerful OSH management module (https://proditysoftware.com/soluciones/seguridad-y-salud-sst/), used by the ALSEA Group (food and delivery services) among other Spanish corporations.

Both software platforms are compatible with OHSAS 18001 and ISO 45001. In their latest versions they have incorporated AI assistants and Artificial Intelligence functionalities for prevention staff.

These systems also allow integration with prevention management systems in the subcontracting of other companies and self-employed workers (Coordination of Business Activities - CAE, see section 4.5).

Both companies are members of the Spanish Technological Platform for Industrial Safety (PESI, http://pesi-seguridadindustrial.org/es), which participates in this SAF€RA project.

Such platforms allow customisation of the OSH Management System and support Prevention Plan protocols, including (among others):

- Risk Assessment: identifying, analysing and evaluating workplace hazards to inform decisions on managing/mitigating risks.
- Emergency Plans: effective response to incidents (fires, chemical spills, natural disasters), including evacuation, communication and medical care.
- Training and Instruction: continuous employee training on OHS, including PPE use, emergency procedures and safe working practices.
- Personal Protective Equipment (PPE): correct use of helmets, gloves, eye protection and respiratory protection to prevent injury/illness.
- Environmental Monitoring and Control: protocols to monitor/control environmental (and climatic) factors affecting workers’ health or the environment (air quality, temperature, noise, waste management).
- Inspections and Audits: periodic activities to identify/correct failures in safety protocols, ensuring compliance and effectiveness.
- Incident Reporting and Analysis: understanding causes of accidents/hazardous events to prevent recurrence, including investigation and corrective actions.

These protocols apply to employees and subcontracted workers from external companies (e.g., delivery fleets). Self-employed riders should also be included.

Accordingly, companies operating delivery platforms should have an OHS management system, complementary to and integrated with algorithmic management. Algorithms should in any case incorporate new safety criteria in the management of delivery orders to riders.

Identification and management of specific occupational risks in delivery workers

The analysis of occupational risks faced by digital platform delivery workers must be carried out taking into account both the material working conditions and the legal framework that regulates them. As indicated in the previous section, in Spain, the “Riders’ Law” clearly establishes that delivery workers who work for digital platforms under conditions organised by the company (working-time control, geolocation, algorithmic evaluation, economic dependence) are considered salaried employees and are therefore protected by ordinary labour legislation, including Law 31/1995 on the Prevention of Occupational Risks.

However, in practice, many platforms such as Glovo have continued to apply covert employment models through figures such as the “false self-employed”, which implies a serious omission of the preventive obligations that every company must assume. This situation generates a double vulnerability for workers: on the one hand, they are exposed to multiple risks without adequate protection; and on the other, they lack effective institutional channels to claim their rights.

Risks faced by platform delivery workers

From the documentary analysis of multiple studies on the main risks faced by delivery workers, we can conclude that such risks can be classified into five major groups:

- Physical risks
- Organisational risks
- Road traffic risks
- Psychosocial risks
- Risks derived from inequality and discrimination

Physical risks

Physical risks arise from prolonged exposure to muscular exertion, the handling of unstable loads (such as large-volume food delivery backpacks), and the adoption of forced postures during long journeys on vehicles that are not always adequate. The intensive use of bicycles or motorcycles creates a risk of musculoskeletal injuries (lumbago, cervical pain, tendinitis), aggravated by the lack of regulated breaks and the economic incentive to maximise the number of deliveries per hour. All these ergonomic risks require specific treatment as they directly affect the occupational health of delivery workers.

In addition, the activity takes place outdoors, which implies direct exposure to adverse weather conditions: rain, wind, cold or extreme temperatures, without most platforms providing suitable technical clothing or personal protective equipment (PPE).

Organisational risks

The organisational design imposed by platforms through their algorithmic systems generates organisational-type risks. The algorithm allocates orders, calculates routes and determines the delivery worker’s rating based on parameters such as punctuality, order acceptance rate, or working-time availability. This operating logic:

- Encourages dangerous behaviours (speeding, running red lights).
- Penalises the rejection of orders, which limits the worker’s decision-making capacity.
- Generates uncertainty and unpredictability in the working day.

- Causes significant variability and uncertainty in economic income.

Furthermore, the absence of a hierarchical structure, a physical workplace, or human interaction prevents effective communication of risks, access to preventive training, or participation in risk assessments, as required by health and safety legislation.

Road traffic risks

The risk of traffic accidents is one of the highest. Delivery workers circulate in complex urban environments, under time pressure, with high vehicle density, and often in adverse weather conditions or at night. They often lack:

- Certified personal protective equipment (reflective vests, approved helmets).
- Visibility elements for night-time delivery.
- Specific training in safe driving or road safety prevention.

The algorithms do not take into account essential elements for safety, such as crossings and traffic lights, pedestrian crossings or interruptions due to roadworks. Nor do they consider traffic conditions (traffic jams), road conditions or weather. This results in the worker being penalised if they fail to meet the estimated time, even if they have acted prudently.

Psychosocial risks

The lack of control over working time, the constant pressure to maintain good performance indicators, isolation, uncertainty regarding income and the possibility of being deactivated without prior notice generate chronic work-related stress. Added to this are the lack of professional recognition, absence of social support, and limited opportunities for career development.

This type of sustained exposure can cause symptoms of anxiety, insomnia, mental fatigue and emotional exhaustion, as well as phenomena of depersonalisation and disengagement from work, especially among those who do not find alternative employment opportunities.

Risks derived from inequality and discrimination

The delivery workforce includes a high percentage of migrant workers, often in precarious regularisation situations or without social support networks. This increases their vulnerability to abuse, threats or exploitative working conditions. In the case of female delivery workers, additional risks include sexual harassment, insecurity in certain areas and working hours, and the extra mental burden of a double working day (employment and care work).

Most platforms lack specific protocols or active measures to prevent these situations, leaving these groups in a situation of structural vulnerability.

Psychosocial risks in platform delivery workers

Psychosocial risks are those organisational, social and emotional factors in the work environment that can negatively affect the psychological, emotional and social well-being of workers. In the case of platform delivery workers, these risks are particularly relevant and appear with greater intensity than in other sectors, due to the design of the organisational

model, the absence of stable employment relationships, and the lack of specific preventive measures.

In recent years in Spain, there has been particular concern about psychosocial risks, extending to the field of platform delivery workers. The INSST has promoted some of the important studies we have reviewed in this work (2) (14). The Labour Inspectorate drew up a document defining the Technical Criterion on Psychosocial Risks (104/2021), detailing the criteria to be considered in the management of these risks by companies (12).

For the evaluation and management of psychosocial risks for workers, different entities have developed various methodologies. The most notable is the methodology developed by the INSST: FPSICO, the latest version of which is 2022 (Psychosocial Factors. Assessment method. Version 4.1, AIP.29.1.22) (15). This methodology could be used by platforms within their preventive management system.

The INSST also developed a questionnaire (13), with 60 questions in 8 blocks, to carry out detailed studies on the situation of riders in relation to psychosocial risks. However, it has not been used due to the complexity of its implementation and the difficulty of selecting workers.
In addition, the European Agency EU-OSHA has produced an “E-guide for managing stress and psychosocial risks”, available on its website (16). The guide is particularly aimed at small businesses and workers, with a synoptic and conceptual content. We believe that it could only be used with riders as a support tool for an expert leading working sessions with workers.

Algorithmic control and performance pressure

One of the main psychosocial risk factors in this type of work is algorithmic control. Delivery workers are subject to a continuous scoring system based on delivery times, working-time availability, acceptance of orders, customer ratings, among other factors. This system generates constant pressure to maintain good performance, under the implicit threat of being “deactivated” (expelled from the platform) without prior procedure or right of appeal (1).
The direct consequence is workers’ self-imposed pressure to optimise their times, accept orders even under unsuitable conditions, avoid breaks and take risks on the public road, thereby increasing the emotional and cognitive load.

Isolation and lack of social support

Work is carried out individually and remotely, without common spaces or interaction with colleagues or supervisors. This hinders the creation of support networks, the collective identification of problems, or the existence of union representation. The sense of occupational loneliness and the impossibility of sharing experiences or concerns accentuate psychological isolation, fostering symptoms of anxiety or emotional disconnection from work.

Contractual and economic insecurity

Despite the entry into force of the Riders’ Law, many platforms continue to operate under conditions that do not guarantee contractual stability or minimum income. Delivery workers do not know how much they will earn in a working day, nor if they will remain active the following day. This permanent job insecurity, together with the direct economic dependence on the number of orders delivered, generates a climate of chronic uncertainty that negatively affects mental health.

The absence of basic guarantees, such as coverage in case of sick leave, entitlement to paid holidays or planning of rest periods, multiplies the impact of these psychosocial factors.

Lack of communication and participation channels

In most cases, workers do not have access to direct communication channels with human managers, nor spaces to express their needs, doubts or complaints. Communications are carried out through automated forms or standardised responses, which generates frustration and a sense of helplessness.

The inability to participate in risk assessments, in defining working hours or in planning routes reinforces the lack of control over work, a factor recognised as a trigger for work-related stress according to multiple studies (2)(3).

Risks in vulnerable groups

Migrant workers, female workers and workers with gender diversity are exposed to aggravated psychosocial risks. In the case of women, fear of harassment, insecurity during night shifts or in conflict-prone areas, and the lack of institutional support in cases of violence increase the emotional burden of work. Workers with gender diversity face similar issues. Migrant workers, often without regular documentation or with limited language skills, suffer higher levels of exploitation, discrimination and lack of access to support networks.

In these groups, the emergence of sleep disorders, anxiety, chronic fatigue, irritability or even depressive symptoms is particularly concerning, and in many cases they do not receive medical or psychological care due to economic or administrative barriers.

A recent study carried out by researchers from Tampere University on the occupational risks of riders proposes a different approach for the risks affecting migrants, categorising them as “Institutional risk” (due to immigration and legal status) (17).

This “institutional” risk arises from insecurity regarding residence and work permits, access to social security, or self-employed worker status. This situation has led migrants to become riders by renting the account of a legally registered delivery worker, who retains a high percentage of the income generated by their work (around 30%). This situation in itself increases risks linked to job precariousness and can reach conditions close to forced labour. It also carries additional insecurity (with legal implications) in the event of any incident or accident, both for the worker and for the platform service and its customers. Solving this problem requires inter-institutional action by governments and the active participation of platforms, which could easily implement mechanisms to detect and prevent such situations.

Necessary psychosocial preventive measures

Despite the seriousness of these factors, few platforms have incorporated specific measures to reduce these risks. As employers (under the Riders’ Law), they are legally obliged to:

- Assess the psychosocial risks arising from the organisational model.
- Guarantee minimum breaks and rest periods during the working day.
- Establish human, accessible and empathetic communication systems.
- Provide training on emotional management, stress and mental health.
- Offer psychological support in cases of crisis or conflict.

These measures should not depend on the worker's own initiative but must be integrated into the company's (platform's) preventive planning, as required by current legislation. As we have indicated, these measures do not necessarily need to be implemented directly into the platform's algorithms, but must be included in the company's occupational risk prevention management system, covering all workers individually, including delivery riders whether or not they are on payroll. The platform's risk prevention management system must be integrated with the algorithm in order to take into account the individual characteristics of each rider when assigning deliveries.

Road safety in urban food delivery

Road safety is one of the main pillars of risk prevention in delivery work through digital platforms. These workers are highly exposed to the risk of traffic accidents, as they carry out their activity in dense urban environments, under tight deadlines, in changing weather conditions, and using light vehicles such as bicycles, motorcycles or electric scooters. Despite this constant exposure, many platforms do not integrate road safety into their preventive planning, thereby failing to comply with their legal obligation as employers under the provisions of the Riders' Law and the Occupational Risk Prevention Act.

Despite the high accident rate among riders, there are no specific studies or official statistics within EU countries with disaggregated data for this group compared to general road accident statistics for workers.

In Spain, the mutual insurance company ASEPEYO maintains an annual Labour Accident Observatory, which includes a section on road accidents (18). The statistics come from workers treated for accidents in their medical services. Although the data cannot be extrapolated at national level, they provide relevant information on road accident profiles. Data for 2023 indicated that seven out of ten road accidents during working hours in the hospitality sector involved food delivery riders using bicycles or motorcycles. In other sectors, accidents with two-wheeled vehicles account for around 20% of the total, but the high incidence in the hospitality sector (73%) raises the average to 39%, mainly due to riders. The profile of the injured rider is a man under 30 years of age, with a part-time, non-permanent contract, who suffers the accident between 20:00 and 00:00 hours. The statistics show that 95% of those injured had part-time temporary or intermittent contracts, compared with 5% with permanent full-time contracts. 93% were men compared to 7% women, and 82% were under 30 years of age. According to Mr. Constantino Perea of ASEPEYO, head of the study: "It is necessary to adopt powerful and high-impact awareness-raising measures for two-wheeled vehicle drivers in this sector, and it is essential to implement specific mobility plans in the workplace."

A study carried out in Brazil found a very high level of occupational accidents among platform delivery workers, with a prevalence of 44%, rising to 50% among those working 10-hour days or seven days a week; moreover, 84% of the accidents were road-related (traffic accidents) (19).

Another study in Taiwan analysed the effects of platform-related work pressure on riders in food delivery; one of the results obtained was that the main consequences of such pressure were a sharp increase in workers' stress and, associated with this, risky driving behaviours and distractions, which led to very high road accident rates (20).

Also noteworthy is a study carried out in the UK by the Centre for Transport Studies on motorcycle food delivery (21). The study analyses the impact of the digital platform business model on riders' driving behaviour and their safety. In addition to highlighting how algorithms contribute to road accidents, it makes recommendations on using existing technology to analyse driving practices and reward safe drivers by sharing their performance with other riders, while penalising or excluding riders with unsafe driving behaviour. These recommendations, though interesting, would require legislative changes in road safety, as well as raising concerns about drivers' privacy and confidentiality (labour and social rights).

Specific road risk factors

In summary, the main factors that increase road risk in this delivery workers are:

- **Time pressure derived from the algorithm**: estimated delivery times do not account for contingencies such as traffic lights, congestion, roadworks or weather conditions. Penalties for delays force unsafe behaviours, such as speeding, dangerous manoeuvres, and breaches of traffic rules (ignoring stop and give-way signs, running red lights, crossing pedestrian crossings between pedestrians, riding on pavements, etc.).
- **Adverse weather conditions**: rain, extreme heat, wind or reduced visibility directly affect the safety of riding bicycles or motorcycles, especially when carried out without adequate equipment. Working outdoors also entails other risks (insects, bites, wild animals, falling branches, etc.).
- **Traffic, road and environmental conditions**: traffic density and congestion, aggressive driving by some drivers against riders and other slow vehicles (bicycles, scooters), public works and poor road/street conditions (falls), pedestrian flows (collisions, run-overs) and domestic animals (attacks, bites). All these create risk situations and cause accidents, with harm both to the rider and to third parties (people, vehicles).
- **Lack of specific road safety training**: in most cases, platforms do not provide mandatory preventive training in safe circulation, first aid or applicable traffic regulations. This is exacerbated in the case of vehicles that do not require a driving licence, such as bicycles (conventional and electric) and scooters.
- **Use of poorly maintained vehicles**: as these are generally owned by the worker, there is no control over the technical condition of the vehicle (lights, brakes, tyres), which increases accident risk.
- **Digital distraction**: constant use of the mobile phone to receive orders, routes or communicate with the platform constitutes an additional source of distraction, particularly dangerous in urban driving.

Legal obligations of platforms

As employing companies, platforms are obliged to:

- Specifically assess the risk of road accidents under real working conditions.
- Provide periodic training in safe driving, stress management in traffic, and defensive behaviour.
- Ensure the supply and use of PPE for road safety: approved helmets, reflective vests, lights and night visibility elements (vehicle).
- Adapt delivery algorithms to safety criteria, prioritising prevention over performance.

These measures must be integrated into the occupational risk prevention plan and updated periodically according to changes in the urban environment, climate and accident data.

Specific preventive proposals

To reduce riders' road accidents, it is recommended to:

- Incorporate mandatory breaks programmed by the platform after a certain number of deliveries or hours in service.
- Design delivery routes that avoid high-risk points (dangerous intersections, streets without cycle lanes, areas with limited visibility).
- Establish agreements with workshops or technical services to allow subsidised periodic vehicle inspections.
- Promote information and awareness-raising campaigns on road safety among delivery workers, with active participation from the riders themselves.
- Monitor and analyse road incidents to generate real risk indicators that allow adjustments in planning.

Integrating road safety as a cross-cutting axis in prevention is not only a legal requirement but also an urgent necessity to reduce this group's high accident rate. Traffic accidents are not residual risks but structural ones, requiring direct, coordinated and sustained intervention over time. Therefore, the support of a preventive management system that incorporates riders' road safety is essential. And as indicated in relation to other risks, algorithms must include basic road safety criteria and indices in delivery assignment and integrate preventive information from the management system (road safety reminder messages sent to the rider's smartphone app along with the delivery request).

Some examples of institutional road safety campaigns

Directorate General of Traffic in Spain (DGT)
The DGT has implemented new regulations in 2024 (22) that affect riders and other drivers. Among the most relevant measures are:

- Mandatory use of full-face helmets and approved gloves: all motorcyclists must wear helmets that comply with European safety standards.
- Special course for motorcycles: riders of motorcycles over 125 cc must complete a special course.
- New regulations for Personal Mobility Vehicles (PMVs: scooters and conventional and electric bicycles): PMVs are banned from riding on pavements and must use cycle lanes or the roadway. Scooters must meet new technical requirements (maximum speed limited to 25 km/h, minimum technical characteristics – braking system, lights and reflectors, and weight limits –) in order to obtain a compulsory circulation certificate. In some cities, liability insurance will also be required.
- Increased penalties for mobile phone use while driving: fines and penalty points have risen since mobile phone use is one of the greatest risks of distraction while driving; for riders, fines can reach €700, though enforcement is limited given that most riders use vehicles that do not require a driving licence (points-based permit) and, due to their mobility, are harder to stop by police.
- For cyclists and scooter users: wearing reflective vests and helmets is compulsory, and there are also penalties for alcohol and drug use and for wearing headphones.

These measures aim to improve road safety and protect vulnerable road users, including two-wheeled delivery riders. However, they require a broader information campaign than that carried out by the DGT. It is recommended that information be disseminated through platforms and social networks (followed by riders, possibly using "influencers" for this group). Some road safety organisations have developed infographics of these new rules showing riders on

bicycles or motorcycles, but although published online, they have not had an official dissemination plan or DGT backing. The information campaign should be completed with systematic urban roadside checks and stops by municipal and traffic police (local, regional and DGT), initially informing riders of the new regulations and possible breaches, followed by a second phase issuing fines (publicising them through rider-friendly social channels for greater reach) to ensure compliance with the new rules.

INSST: road safety information and actions for workers and riders

In recent years, the INSST has published a collection of materials on occupational road safety (guides, studies, mobility plan models, etc.) for use by company OSH technicians (23). Platform Prevention Services managers can consult these materials for guidance on road safety for their employees and riders, both on duty and commuting (where general accident rates are higher than during working hours), in order to develop a specific Road Safety Plan with preventive training and information actions. It also includes the definition of certain criteria and parameters to be incorporated into algorithms for task allocation, providing riders with road safety information along with delivery assignments.

The INSST also developed a campaign specifically for delivery workers entitled Hazte visible (“Make yourself visible”) (24). This campaign aimed to improve riders’ visibility on public roads in relation to other vehicles (trucks and vans) and prevent road accidents. The campaign included a series of materials: an information poster on blind spots, magnets on blind spots for buses, vans and cars, and a kit of retroreflective stickers for helmets. These were distributed to delivery and public transport companies and are available on the campaign website. This campaign (2018) predates the rise of digital delivery platforms and has not been updated, but it still retains interest and utility.

OSALAN Basque Institute for Occupational Safety and Health (Basque Country, Spain)

OSALAN has carried out various activities to promote occupational road safety (seminars, courses, etc.). The most relevant include the Segurbide project, which produced the Practical Guide to Occupational Road Safety (25).

This initiative involved PESI itself, together with its partners Fesvial and Tecnalia, under the direction of the author of this study, José-Javier Larrañeta. They developed several road safety actions for OSALAN, including defining a “Reference Framework for Safe Corporate Mobility and Occupational Road Safety” for company directors, and the Practical Guide to Occupational Road Safety for OSH and mobility technicians.

The 2019 guide already considered corporate organisation as a crucial factor, complementary to the three classic road safety elements (driver, vehicle and road). Algorithmic management in relation to delivery tasks and riders is regarded as a critical factor, but unlike traditional management, algorithms do not take any of these road safety elements into account. For this reason, digital platforms must be required to make a radical change in algorithmic management, incorporating road safety as a basic premise and taking into account the other elements: rider, vehicle, and road (road conditions, traffic and weather on the route).

In collaboration with the Basque Traffic Directorate (Department of Security, Basque Government), the same team also designed the Innovabide campaign to promote a “Network of Companies Committed to Road Safety” (26), involving company directors and OSH and

mobility technicians. As a working tool, the Reference Framework for Safe Corporate Mobility was used, enabling companies to define their strategies and action plans to improve workers' road safety. Industrial, service and transport companies participated.

International OSH agencies: HSE (UK) and SafeWork (Australia)

At international level, we have selected two OSH agencies with significant initiatives in road safety, particularly for delivery workers: the UK Health and Safety Executive (HSE) and Safe Work Australia.

HSE (UK): Driving and riding safely for work

The HSE provides a structured set of road safety materials (vision, methodology, content on risks and preventive measures, and a collection of resources) entitled Driving and riding safely for work (27). Together they form a comprehensive support guide for both companies (OSH technicians and mobility managers) and workers (employees and self-employed).

The content is grouped into five categories: Employers (safe driving at work and commuting), Workers (drivers), Road Safety Working Group, Vehicle safety technologies and telematics, and Resources. All this material follows a methodological framework entitled the "Safe journey, safe driver or rider, safe vehicle" approach to driving and road safety management at work. The documents explicitly cover digital platform delivery riders as a category comparable to in-house employees, for road safety management purposes.

The road safety approach and guidelines for companies include:

- General description of road safety (company obligations for employees using vehicles, riders and external fleet drivers, risks and their management, vulnerable workers).
- Planning and managing journeys (journey plan, breaks, communication and accident investigation, vulnerable road users, working hours, adverse weather, vehicle safety monitoring technology, rider apps and driving distraction).
- Ensuring drivers are safe (trained in OSH, road safety guidelines, road safety training for drivers and riders, safety instructions, distractions, violence and aggression, subcontractor responsibility).
- Safeguarding workers' health (OSH requirements for driving, fatigue, stress and mental health, driving ergonomics).
- Ensuring vehicles are safe (suitable for the task, vehicle safety measures, vehicle maintenance, riders and two-wheeled vehicles).
- Legal driving regulations and enforcement.

The web resources are complemented with a road safety management leaflet following the principles: Plan, Do, Check, Act.

Safe Work Australia: "Deliver yourself home safely" campaign

Safe Work Australia has developed a comprehensive information and support programme for food delivery riders and their employers (platforms and food outlets) (28). The information available on the website is clear and direct, with simple messages identifying the main risks, especially road-related ones, and practical recommendations to prevent accidents. We consider this initiative to be a highly useful institutional action and a good example for other OSH agencies.

The programme includes a specific campaign entitled Deliver yourself home safely. The website contains a collection of resources such as leaflets, infographics, videos and a complete campaign kit in multiple languages (covering the main nationalities of riders: Chinese, Hindi, Nepali, etc.). The campaign also appeals to riders' family feelings, highlighting that just like any customer, their family wants them to return home safely. References to road safety are constant in the messages and infographics, including a specific section on the maintenance of electric vehicles (bicycles, scooters) and battery charging (overheating and fire risks). The campaign incorporates gender, equality and cultural diversity perspectives throughout its materials, alternating male and female rider figures.

Preventive measures: elimination or mitigation of risks

Occupational risk prevention in the field of delivery through digital platforms requires a comprehensive adaptation of the business model to the principles set out in current regulations. The adoption of Royal Decree-Law 9/2021 (Riders' Law) confirms that these companies act as employers and therefore have the legal obligation to integrate prevention at all levels of their activity.

As recommended, this adaptation and compliance can be carried out on two levels. A first, basic level would consist of adopting a comprehensive prevention management system to support the activities of the platform's own Prevention Service (with possible support from an External Prevention Service – SPA). The preventive management system must cover all personnel: in-house staff and payroll riders, those from subcontracted logistics companies, and riders who remain self-employed.

Secondly, the algorithmic management should incorporate the most relevant parameters and criteria for delivery workers' safety, so that delivery assignment takes the rider's safety into account and sends them preventive information associated with that assignment. This information on preventive measures and other relevant safety alerts (traffic, road incidents, adverse weather, etc.) can be issued from the Prevention Management System to the rider's app. This can be achieved by integrating the two technological systems: the delivery management platform and the prevention management system.

Below are the priority measures to be adopted, classified by type of risk.

Physical risks

- Ergonomic assessment of the work: analyze the physical load associated with prolonged use of bicycles, motorcycles or scooters, backpack weight, and repetitive journeys.
- Mandatory provision of Personal Protective Equipment (PPE): ergonomic backpacks; waterproof, reflective clothing adapted to weather conditions; gloves; non-slip footwear, etc.
- Structured breaks: design algorithms that include mandatory breaks to prevent physical and mental fatigue.
- Preventive medical check-ups: establish voluntary health surveillance systems to detect musculoskeletal disorders at an early stage.
- Organisational risks
- Algorithm redesign: remove penalties for rejecting orders and unrealistic delivery times. Incorporate safety criteria (weather, traffic, breaks) into order assignment.

- Working-time limits and planning: set daily and weekly caps and prevent unlimited connection to the system by workers.
- Contractual stability: effective compliance with the Riders' Law, guaranteeing employment contracts with basic rights (holidays, leave, minimum rest).
- Participation in prevention: create committees or worker representation structures to participate in preventive planning.

Road risks

- Mandatory road safety training: programmes on safe urban riding/driving with practical and accessible content.
- Safe routes: use urban mobility data to define lower-risk areas, avoiding streets with high accident rates.
- Vehicle maintenance: contractual obligation for periodic inspections of the means of transport, with technical support or financial allowances.
- Visibility and signalling: mandatory use of reflective vests, front and rear lights, and high-visibility elements on the backpack.

Psychosocial risks

- Psychosocial risk assessment: apply methodologies such as INSST's FPSICO method (15) or similar to assess mental workload, job control, social support, etc.
- Emotional support systems: free psychological helplines, available especially during high emotional load or night shifts.
- Human communication channels: create points of contact with real personnel to resolve queries, conflicts or labour complaints.
- Digital disconnection: establish the right to disconnect once the shift has ended, without penalties for unavailability.

Risks due to discrimination or inequality

- Protocols against sexual harassment and sex-based harassment: draft, disseminate and enforce protocols with a gender perspective, including confidential channels and clear disciplinary measures.
- Mandatory training in equality and diversity: content on harassment prevention, intercultural awareness and respect for diversity.
- Linguistic adaptation: preventive materials available in multiple languages to ensure understanding among migrant workers.
- Equality plans and disaggregated data: systematic analysis of risk gaps and exposure by sex, age, origin or migration status.

Labour supervision and inspection

Public authorities should strengthen labour inspections specifically for companies with digital platforms, with protocols adapted to algorithmic management and to this type of decentralised delivery work. Supervision should include:

- Verification of compliance with the Riders' Law.
- Review of the delivery workers' actual working conditions versus those declared.
- Assessment of the existence of effective preventive measures for riders.
- Application of sanctions in cases of serious non-compliance.

Model for Coordination of Business Activities (CAE) for OSH management

In Spain, there is a mechanism associated with preventive management in activities involving subcontracting of different companies and self-employed workers, such as infrastructure construction or various installation repair activities. In such cases, the principal company on which the subcontractors depend must ensure appropriate information and training on safety and prevention for all workers involved. This model is called Coordination of Business Activities (CAE in Spanish) and is regulated by Royal Decree 171/2004 of 30 January, which implements Article 24 of Law 31/1995 on the Prevention of Occupational Risks in relation to the coordination of business activities (29) and related regulations (30).

In the context of occupational risk prevention, CAE aims to guarantee a safe and healthy working environment, with the following main objectives:

1. Apply preventive principles in a coherent and responsible manner, as established in the Occupational Risk Prevention Act (LPRL).
2. Control risks associated with concurrent activities at the same workplace, ensuring that all companies involved act in a coordinated way.
3. Establish means of coordination, which may be recommendations (such as periodic meetings) or obligations (such as appointing a coordinator).
4. Comply with current regulations, such as Royal Decree 171/2004 regulating coordination of business activities and preventive resources.

Through this system, the principal company can carry out complete preventive management of all activities and for all workers involved (identification of risks by task and location for each job, associated preventive measures, collective safety systems, protective equipment and PPE to be used, preventive information, OSH training requirements for each worker, etc.).

For CAE management there are multiple software systems that facilitate the principal company's Prevention Service in entering all this information and transferring it to subcontracted companies (OSH technicians) and self-employed workers. Subcontracted companies provide such preventive information to each of their workers and any possible subcontractors involved in tasks for the principal company. In turn, the subcontracted company provides, through CAE systems, personal information for each worker to be assigned, their employment status, ensuring that they have adequate preventive training and are aware of the preventive measures defined for their job or activity. These CAE systems are usually integrated with companies' OSH management systems and facilitate Labour Inspectorate work in activities involving large numbers of workers from different companies and other self-employed professionals.

Although the case of digital platforms and preventive management of delivery workers may appear simpler than large construction projects requiring a CAE, we consider that this model could be easily adapted to platforms, as it would allow management of in-house riders, subcontracted fleet riders and self-employed riders alike. This CAE management could be integrated into the preventive management system we have been recommending for platforms.

Safety and OSH notices and recommendations in delivery activities

In risk management, the main actions focus on eliminating or remedying hazards in the workplace and during task performance, together with prior information and training actions

and the proper use of PPE. However, we also consider it equally relevant to include information and warning actions regarding imminent risks based on variable conditions such as those occurring in delivery work (weather, traffic, road conditions, emergencies).

These notices are temporary in nature, directly linked to each delivery task, and are based on higher-risk situations such as changes in traffic conditions, weather conditions, as well as possible emergency alerts or recommendations from public authorities (roadworks, traffic diversions, restricted access zones due to public events, serious incidents, etc.).

The possibility of issuing such notices immediately and directly to workers is feasible thanks to the telematic systems available through digital platforms. These notices could be issued alongside the pick-up and delivery requests received by the rider. From a technological perspective, it would be feasible to add this notice system to the app that manages delivery workers' work orders. In a first phase, such notices could be generated by the Prevention Service team in coordination with the platform's managers, and in a second phase semi-automatically, supported by Artificial Intelligence applications handling real-time information on the risk variables to be considered.

Availability of this notice system would allow the Prevention Service to send planned prevention and safety recommendations to riders. For example, depending on the season (as each has different weather characteristics in each region or city), recommendations on appropriate clothing and footwear (PPE) and safe riding instructions could be provided. On special dates such as festivities and holiday periods, when there are major population movements with significant effects on traffic, special road safety recommendations could be issued. More generally, periodic safety and health recommendations could be given, such as:

- Physical and ergonomic risks (delivery backpacks).
- Possible pandemics (avoiding contagion).
- Correct use of PPE (helmet, gloves, technical clothing according to season).
- Risks related to outdoor work (solar radiation, wind) and skin care.
- Potential violence situations and reporting mechanisms.
- Support mechanisms in cases of stress (psychosocial risks).
- Road safety (compliance with traffic rules, caution with pedestrians, etc.).

Currently, all European countries, and even some EU regions, have Meteorological Agencies providing detailed weather forecasts (temperature, wind speed, probability and type of precipitation – rain, hail, snow – for specific locations and time slots). This information can be used for prevention.
Other variable information on delivery working conditions is already accessible to some extent thanks to the digitalisation of Public Services at community and city levels (citizen information, municipal and general), with quality and accuracy improving progressively. Private mobility portals also exist, such as Google Maps, which provide local traffic information and route management (including incidents, delays due to congestion, roadworks or other problems). Furthermore, new public–private digital platforms are emerging, reporting on street conditions, roadworks, public events affecting mobility in specific areas, and emergency or safety issues. In the near future, such data will be provided by a Digital Twin of the city or regional transport infrastructure.

All this information is highly relevant for Occupational Health and Safety and Road Safety in outdoor and transport-related work activities (including food delivery). As open data sources, it can be integrated into information systems such as digital work platforms (delivery apps),

linking specific risks with prevention measures and tailored recommendations for each delivery task.

However, modifying existing platform algorithms may prove complex and undoubtedly costly. Firstly, technological challenges exist in making the system automatic (integrating existing delivery task management systems with new alert systems, which themselves rely on external information systems). More importantly, parametrising situational values (traffic and weather) in real time (and their short-term forecasts) to associate them with risk typologies and severity levels, so that the most appropriate prevention and safety recommendations are automatically issued for each delivery, is particularly complex.

Undoubtedly, new Artificial Intelligence applications can help meet this challenge of integrating Safety Alert Systems, provided public information services (mobility, traffic, weather, incidents and safety issues) are consolidated and equipped with technological interfaces that allow their integration into platform algorithms or complementary information systems (for safety and prevention management).

A practical alternative at present would be for operators of the automatic order and delivery management system to monitor city traffic and weather information services in order to issue specific warnings when evident risks arise. This would require minor adaptations to algorithms to enable this functionality, in coordination with the guidance and information that the Prevention Service must provide to riders regarding imminent risks.

The involvement of the Prevention Service in platform operations would also facilitate management of possible accidents and workers' health, support the handling of sick leave due to accidents or illness, and ensure liaison with insurance companies (vehicles) and Occupational Accident Mutual Insurance Societies, as well as reporting these incidents to the Labour Authority.

Preventive good practices in the delivery sector

In the previous chapters we have presented the demanding legal framework, both in Spain and in the European Union, regarding the working conditions of riders working for digital delivery platforms, which in practice are widely breached by these companies. We have also detailed the obligations in preventive management that platforms should fulfil, providing information on how companies in traditional sectors implement them, through the creation of a Prevention Service, the support of specialised companies (SPA – External Prevention Services, consultancies and even Mutual Insurance Societies), and the use of prevention management systems and possible tools (CAE). These models could be implemented in a practical and not overly complex way by platforms, complementing their current algorithmic management, which is deficient in terms of safety and prevention.

We have identified in detail the main risks of this group of "gig economy" workers and proposed specific actions to mitigate such risks. We have also highlighted some institutional campaigns that have developed support materials for preventive management in rider activity.

For this reason, the authors of this study considered it important to include a chapter on good practices in preventive management of riders by a digital delivery platform that we regard as an example of compliance with legislation and commitment to the safety and health of its

workers: Just Eat Takeaway Spain. Finally, we also comment on some good ideas and cooperation initiatives between platforms, delivery workers and institutions.

Example of adequate OSH protocols in delivery work: Just Eat Takeaway Spain

As mentioned earlier, the delivery platform company Just Eat Takeaway Spain has actively collaborated in this study, validating the criteria defined by the PESI research team as ideal requirements for OHS management, worker prevention and training. Through several working meetings with the Just Eat team, we gathered information on their labour policy and prevention management procedures with all their delivery workers.

The fact that most of their workers are on employment contracts, strictly complying with Spanish legislation (labour and prevention) and in line with the European Directive on riders, demonstrates the company's true commitment to the safety and health of its workforce.

Moreover, the age and gender distribution of workers is far broader than in other digital delivery platforms. Indeed, 10% of Just Eat Spain's 2,500 riders are women and 30% are men over 50 years old, compared with 60% younger and middle-aged men (the majority and almost exclusive profile in other platforms).

The example of Just Eat Spain confirms that the European Directive on the employment status of digital platform workers is very appropriate as it promotes equality and employability in the gig economy, alongside decent working conditions. It also strengthens workers' safety and health by ensuring compliance with safety and prevention regulations and establishing good OSH practices within digital platforms.

Protocols of Just Eat Takeaway Spain

We verified that Just Eat Spain's rider management protocols are adequate and efficient. They aim to improve operations and rider safety, although they are not automatically integrated with the platform's algorithms. Operations follow a mixed model of collaboration between the Prevention Service, zone coordinators (responsible for local facilities/garages) and supervisors of the platform system.
The overall cycle of action with workers is exemplary, covering recruitment through to day-to-day OSH management and continuous preventive training. In the case of riders, the process includes:

a) Initial recruitment and onboarding plan
   - The employment contract includes a complete "Risk Sheet" for the job and the first training linked to delivery (Courier Learning Experience).
   - Workers are offered an accident protection package, including pregnancy and lactation coverage for women, and health surveillance services (free medical check-ups, with the possibility of opting out in writing).
   - Initial training covers:
     - Use of digital applications (interaction with the platform).
     - Information on equipment (clothing, PPE) and vehicles.
     - Description of delivery situations and solutions.
     - Non-regulated OSH training on:
       - Traffic signs and road rules.
       - Risk perception on the road.

- Extreme weather conditions (heat, cold).
- Threats and assaults.
- Code of conduct.
- Physical and mental wellbeing.

b) Mandatory OHS training plan
The formal prevention training plan is delivered online by the External Prevention Service ASPY, which also provides health surveillance to riders. This complies with Spanish Law on OSH (Law 31/95, Art. 19). ASPY issues certification of compliance with mandatory OSH training and information for the job of “Delivery Rider”.
In addition to mandatory training, it includes modules on:
- Job risk sheet description.
- Load handling.
- Road safety recommendations for vehicle driving.
- In itinere traffic accidents.

c) Provision of uniform and PPE
After completion of training delivery workers receive the uniform and PPE. Depending on the season, this includes:
- Approved helmet.
- Waterproof jacket with reflective elements.
- Protective gloves.
- Waterproof trousers.

d) Ongoing information and additional training.
- Workers receive informative leaflets covering:
- Delivery driving recommendations.
- Use of petrol and electric motorbikes.
- Safe working instructions.
- Basic cycling/scooter rules.
- Ten Golden Safety Rules.
- Vehicle user manuals.

Further OSH training is provided in collaboration with ASEPEYO (Mutual Insurance Society), aiming to strengthen safety knowledge and prevent accidents.

Operational OSH management in Just Eat Spain

The operational model involves collaboration between the Prevention Service, area coordinators (garage-based rider hubs), and platform supervisors.

- **Weather-related risks**: the Prevention Service has three alert levels depending on weather, with corresponding actions. These are based on forecasts from AEMET (Spanish Meteorological Agency). Information is relayed to supervisors (who manage algorithmic work orders) and area coordinators (acting as “designated prevention staff”), who then convey verbal safety reminders to riders.
- **Physical coordination**: Zone coordinators, who are part of the OSH Committee with Prevention technicians and worker representatives, act as human contacts for riders. Supervisors, through the rider app, receive incident reports and accidents, which are passed to Human Resources Dpt. and Prevention Service for follow-up with Insurance companies and Mutual Societies.

- **Restricted zones**: Just Eat excludes high-crime neighbourhoods from delivery to protect riders' safety.
- **Worker restrictions**: The Prevention Service monitors age/health conditions, restricting older workers or pregnant women from high-heat summer deliveries.
- **Accident investigation**: in collaboration with the Mutual, accidents are investigated to improve safety, identify risks, and update rider training.
- **Pregnancy and lactation**: together with Mutual and health surveillance doctors (SPA), the company applies criteria on work restrictions, monitoring women's health and providing economic allowances during such periods.
- **Health surveillance**: medical check-ups are available for all riders (opt-out possible), performed by the SPA under strict privacy protocols.
- **Psychosocial risk assessment**: carried out progressively across regions, identifying workload issues, discrimination and communication improvements.

As explained earlier, psychosocial risks are the most significant for this workforce. However, Just Eat's employment model, supported by HR, OHS services, the Mutual and SPA, shows that while psychosocial risks exist, they are less severe compared with platforms relying on precarious self-employment.

Experiences and good practices for digital platforms

Despite the structural limitations of the digital platform model, positive experiences have been identified in other countries as benchmarks for improving rider safety and health, such as cooperative models. These good practices can also be promoted by public administrations or institutional alliances. They must focus on effective application of OHS and dignifying riders' working conditions.

Some of the most notable are:

- **Cooperative platform models**, where riders are employed as salaried workers, with access to mandatory OHS training, systematic PPE provision, and direct participation in work organisation and algorithm design (8)(32)(33).
- **Agreements with local authorities** for urban delivery infrastructure: safe lanes, temporary parking, rest areas, hydration points and charging stations for electric bikes/motorcycles. This aligns with OSH recommendations on road risk and rest in mobile work, as well as ergonomic and safety improvements (1).
- **Health monitoring campaigns** by Mutual Insurance Societies or SPAs, focusing on early detection of musculoskeletal disorders, fatigue and pathologies from intensive, autonomous work. OSALAN highlights the need for such programmes as part of active prevention strategies (1).
- **Worker participation in algorithm evaluation**, via consultation, complaints or adjustments to delivery times set by the app, avoiding overload or reckless driving (10)(33)(34).
- **Awareness programmes** targeting society and businesses, promoting respect for riders, discouraging extreme immediacy demands from consumers, and recognising the essential value of this service for urban life (10)(34).

These initiatives provide viable examples of a preventive culture applied to digital environments, demonstrating that protecting occupational health is compatible with flexible models, provided there is regulatory commitment, business will and institutional cooperation.

They show that realistic, inclusive and effective prevention is possible where companies and institutions are willing to support it.

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10 Risk Management for Vulnerable Platform Workers in Spain

Risk Management in Vulnerable Groups and from a Gender Perspective for Platform Delivery Workers (Riders)

Yolanda García Martínez

This study is based on an analysis of Spanish legal regulations, both the general framework on occupational risk prevention and specific legislation relating to gender issues, inclusion, and immigration matters linked to employment. Numerous studies, statistics and guidance documents developed by the National Institute for Safety and Health at Work (INSST), OSALAN (Basque Institute for Safety and Health at Work), and other occupational safety and health (OSH) bodies have also been analysed, alongside documentation produced by Occupational Health Services Providers and Training Centres. Media reports concerning this business sector and its workers have also been taken into account.

This is further supported by the Author's own professional experience. Over 29 years of practice as a legal adviser and practising lawyer, she has developed extensive expertise in labour law, occupational risk prevention legislation and case law.

INTRODUCTION

In recent years, the development of digital technologies has profoundly transformed labour market dynamics. One clear example of this transformation is the emergence and consolidation of digital delivery platforms such as Glovo, Uber Eats or Just Eat, which have established new forms of work organisation that differ from traditional employment structures.

These platforms operate through mobile applications that allocate orders, manage routes, assess performance and process payments, all through algorithmic systems functioning without direct human contact and outside the classical contractual framework between employer and worker.

The purpose of this technical report is to carry out a comprehensive analysis of the occupational risks associated with delivery work performed through digital platforms, with particular attention to its impact on workers' health and safety, taking into account a gender perspective (and vulnerable groups). The relevance of this study lies in the increasing precariousness, invisibilisation and fragmentation of this type of employment, which raises urgent challenges in the field of occupational risk prevention.

Unlike regulated sectors with clearly defined contractual categories, the employment relationship within digital platforms is diffuse. It is often presented as self-employment, although in practice there are mechanisms of subordination and control characteristic of a dependent employment relationship. These include unilateral scheduling, penalties for rejecting orders, constant geolocation, inability to negotiate working conditions, and total dependence on the technical functioning of the system. This legal ambiguity hinders the implementation of preventive measures, as neither platforms nor workers benefit from clear structures of representation, consultation or training in occupational health and safety matters.

Furthermore, this report is based on the premise that delivery workers do not constitute a homogeneous group. There is significant diversity in terms of gender, age, nationality, language, administrative status and educational background, resulting in an unequal distribution of risks and specific barriers to accessing protection mechanisms. Women, for example, are more exposed to harassment and gender-based violence, while migrant workers face multiple forms of discrimination, documentary precariousness and a higher risk of informality.

For all these reasons, this technical report seeks to identify the main risk factors associated with the platform work model, describe their impact on workers' physical and mental health, and propose realistic and applicable preventive measures from both a technical and regulatory perspective. This analysis is developed from an approach that integrates prevention into the very design of digital work platforms, promoting shared responsibility among the stakeholders involved: digital platforms, public authorities and the workers themselves.

METHODOLOGY AND DOCUMENTARY FRAMEWORK

This report has been prepared on the basis of a systematic documentary review of technical, regulatory and statistical sources related to occupational safety and health in the context of platform-based work. In addition, several interviews were conducted with key stakeholders in this field (OSH technicians and platform managers). The methodological objective has been to integrate the available knowledge from a multidisciplinary perspective, with particular attention to risk prevention in the specific environment of urban food delivery and the workers involved (commonly referred to in Spain as "riders").

The documentary basis has comprised:

Technical reports prepared by specialised public bodies, such as OSALAN (Basque Institute for Safety and Health at Work) (1), the INSST (National Institute for Safety and Health at Work, Government of Spain) (2), and the European Agency for Safety and Health at Work (EU-OSHA) (8) (10).

Applicable current legislation, including Law 31/1995 on Occupational Risk Prevention, Royal Decree 39/1997 on Prevention Services, as well as technical documents associated with the implementation of the so-called "Rider Law" (Royal Decree-Law 9/2021), which served as the basis for the subsequent European Directive proposal (9). This legislation was analysed in detail in the previous study, constituting the first part of the SAF€RA project (Labour Laws on the Employment Relationship and Platform Workers in Spain).

Sectoral studies focusing on the effects of digitalisation on working conditions, including emerging risks such as digital fatigue, algorithmic pressure and organisational precariousness.

Specific documents on gender equality, cultural diversity, migrant populations and the prevention of sexual harassment at work, given the diverse and vulnerable profile of a large proportion of delivery workers (3) (4) (5) (6) (7).

The methodology adopted has been qualitative, descriptive and analytical. Key concepts relating to physical, organisational, psychosocial and discriminatory risks have been identified and examined in connection with the particular characteristics of platform-based work and the specific risks affecting women, LGBTQ+ groups, migrants in an irregular administrative situation and senior workers. Based on this analysis, preventive measures have been proposed in line with the principles of action set out in occupational risk prevention legislation, including risk elimination at source, adaptation of work to the individual, and the planning of prevention from the organisational design stage.

This approach makes it possible to identify not only the risks themselves but also the barriers to accessing preventive mechanisms.

Finally, the methodological limitations of this report must be acknowledged. The lack of disaggregated statistical data on platform workers, together with the opacity of the algorithms used by these companies, makes it difficult to quantify risks precisely for any group, and even more so for those addressed in this report. Nevertheless, the convergence of qualitative sources enables the establishment of a robust and forward-looking diagnosis.

Characterisation of work in digital platforms

Work in digital delivery platforms, also referred to as platform economy work or the “gig economy”, represents one of the most significant transformations of the labour market in the last decade. Platforms such as Glovo, Uber Eats, Deliveroo or Just Eat operate as technological intermediaries between demand (customers ordering food or other products) and supply (delivery workers performing the service). Although they present themselves as mere digital tools, in practice they exercise substantive control over the organisation of work, configuring a model that combines elements of self-employment with features typical of dependent employment.

From a preventive perspective, this model raises numerous challenges. Delivery workers do not have a defined workplace or fixed working hours; they perform their activity in highly dynamic urban environments, mainly using their own bicycles, motorcycles or electric scooters, and depend entirely on the digital interface to receive orders, routes, instructions and performance ratings.

This form of work is determined by three key elements:

Algorithmic control: Decisions regarding order allocation, recommended routes, penalties or bonuses are managed by opaque algorithms. This entails an indirect but constant form of labour control, whereby the worker is pressured to optimise delivery times, maintain high ratings and avoid cancellations, without fully understanding the system’s criteria (1)(2).

Limited autonomy: Although formally classified as self-employed, in practice delivery workers are subject to predefined conditions established by the platform: service pricing, time slots, activation and deactivation conditions, among others. This false autonomy restricts access to traditional labour and preventive rights, such as OSH training, provision of personal protective equipment (PPE) by the employer, or participation in risk assessments (3).

Fragmentation and isolation: Work is carried out individually, without direct contact with colleagues, without trade union representation in most cases, and with high worker turnover. This hinders the creation of support networks, the reporting of hazards, and the existence of formal channels for raising concerns or improving working conditions.

Moreover, the delivery workforce displays significant sociodemographic diversity: in many cities, a substantial proportion consists of migrant workers, young people without formal contracts, or individuals in situations of economic vulnerability. This heterogeneity implies that risks do not affect workers uniformly and that solutions must take into account existing intersectional factors.

In terms of workload, delivery workers are exposed to intense conditions: high time pressure, prolonged and frequent journeys in adverse weather conditions, absence of regulated breaks, and constant exposure to urban traffic. The nature of remuneration (payment per delivery) incentivises completing more deliveries in less time, thereby increasing road traffic risk and generating both physical and mental overload.

Finally, it should be emphasised that, within this employment model, platforms have positioned themselves in a preventive legal grey area. Most of these companies do not assume the role of employer, which, according to their interpretation, exempts them from conducting risk assessments, planning preventive measures, providing training or supplying protective equipment. This regulatory gap prevents the effective application of the preventive principles established in current legislation.

In response to this situation of legal ambiguity, the Spanish Government enacted Royal Decree-Law 9/2021, known as the “Rider Law”, which clearly establishes that delivery workers operating under company-organised conditions (time control, geolocation, algorithmic evaluation, economic dependency) are to be considered employees and are therefore covered by ordinary labour legislation, including Law 31/1995 on Occupational Risk Prevention.

Legal and regulatory framework applicable to delivery work in digital platforms

The analysis of occupational risks associated with delivery work carried out through digital platforms must necessarily begin with the current legal and regulatory framework governing occupational risk prevention, equality and protection against violence and harassment at work. This framework is fully applicable regardless of the legal form adopted by the employment relationship, insofar as there is an effective organisational structure controlling the work activity.

Law 31/1995 on Occupational Risk Prevention

Law 31/1995 on Occupational Risk Prevention (LPRL) constitutes the cornerstone of the Spanish preventive system. Article 14 recognises workers’ right to effective protection in matters of occupational health and safety, imposing on the employer the corresponding duty to guarantee such protection.

This right is not conditional upon the contractual modality or the formal designation of the employment relationship, but must be interpreted in light of the material reality of service provision. In the case of delivery work through digital platforms, the existence of systems for organising, controlling and supervising work through algorithms makes it possible to identify an entrepreneurial structure that activates the preventive obligations established in the LPRL.

Article 15.1(d) of the LPRL establishes the principles of preventive action, among which the obligation to adapt work to the individual is particularly noteworthy. This principle acquires special relevance in the analysis of occupational risks from a gender perspective and in the protection of vulnerable groups, as it requires that working conditions, equipment used and the organisation of activity be adjusted to the real characteristics of those providing the service.

Likewise, Article 16 of the same Act imposes the obligation to carry out an occupational risk assessment identifying all existing risks, including psychosocial, organisational and social risks, as well as the planning of preventive activity aimed at eliminating or reducing them.

Regulation on Prevention Services (Royal Decree 39/1997)

Royal Decree 39/1997, approving the Regulation on Prevention Services, develops the LPRL and regulates the organisation of the resources necessary for preventive activity. This regulation requires the integration of occupational risk prevention into the company's overall management system, preventing it from being treated as an isolated or merely formal activity.

Article 3.1 establishes that preventive actions must focus on eliminating or reducing risks at their source, using organisational measures, collective and individual protective measures, as well as training and information. Acting in coherence with occupational risk prevention and equality regulations, preventive action must take into account the specific characteristics of the worker, such as gender and age, in order to ensure effective and appropriate protection.

In the context of digital platforms, this requirement implies that prevention must be effectively incorporated into the business model and into the technological systems organising the work. Risk assessment, preventive planning, training and health surveillance must be adapted to the specific features of delivery work and to the risks derived from algorithmic management.

The Regulation also establishes the need for qualified technical personnel in occupational risk prevention, reinforcing the requirement for platforms to have specialised preventive advisory services capable of identifying and properly managing emerging risks associated with the digitalisation of work.

Organic Law 3/2007 on the Effective Equality of Women and Men

Organic Law 3/2007 introduces a clear mandate for the mainstreaming of the principle of equality between women and men in all public and private policies, including labour and preventive policies. This Act strengthens the obligation to incorporate a gender perspective into occupational risk assessments and preventive planning.

In delivery work carried out through digital platforms, the application of this Law is particularly relevant, given that women and persons with gender diversity may experience differentiated

exposure to certain risks, such as psychosocial risks, sexual harassment and workplace violence, as well as risks arising from the lack of ergonomic adaptation of equipment.

The integration of a gender perspective must not be limited to formal measures, but requires a specific analysis of the differential impacts of work organisation, task allocation algorithms and evaluation systems based on customer ratings.

Consequently, occupational risks must be managed from a non-discriminatory approach, specifically considering how they may affect women and men differently.

Specific Regulations on Platform Work and Labour Doctrine

The regulation of work on digital platforms has undergone significant developments in recent years, notably with the so-called “Rider Law”, which recognises the existence of an employment relationship in certain delivery work scenarios. This regulation reinforces the full application of labour and preventive legislation to digital platforms that organise and control service provision.

From the perspective of occupational risk prevention, this regulatory evolution contributes to clarifying employer responsibilities in matters of health and safety, strengthening the obligation to assess and manage risks arising from algorithmic work organisation.

ILO Convention No. 190

Convention No. 190 of the International Labour Organization (ILO), concerning violence and harassment in the world of work, constitutes a fundamental reference for analysing psychosocial and gender-related risks in delivery work carried out through digital platforms.

This Convention defines violence and harassment as a range of unacceptable behaviours and practices capable of causing physical, psychological, sexual or economic harm, and broadens the concept of workplace to include any space related to work activity. This definition is particularly relevant to delivery work, which is carried out in urban public spaces and involves constant interaction with customers and third parties.

The application of Convention No. 190 requires companies to adopt specific preventive measures against violence and harassment, including risk identification, training, the establishment of action protocols and the effective protection of workers.

Technical Doctrine of Specialised Prevention Bodies

Specialised occupational safety and health bodies, such as the National Institute for Safety and Health at Work (INSST), OSALAN and the European Agency for Safety and Health at Work (EU-OSHA), have repeatedly highlighted that the digitalisation of work and the platform economy generate new occupational risks that must be addressed from a comprehensive preventive perspective.

These bodies emphasise the need to consider algorithms as work tools capable of generating risks, as well as to integrate a gender perspective and the protection of vulnerable groups into all phases of preventive management. Their contributions constitute an essential technical

reference for the analysis and formulation of preventive measures in platform-based delivery work.

Identification and analysis of occupational risks in delivery work on digital platforms for various groups

In the following section, the occupational risks affecting the groups addressed in this study will be analysed. Evidently, these groups are also exposed to the general risks affecting all delivery workers operating through digital platforms.

INTEGRATION OF THE GENDER PERSPECTIVE INTO OCCUPATIONAL RISK PREVENTION

The integration of a gender perspective into occupational risk prevention constitutes a legal, technical and methodological requirement derived from both Law 31/1995 on Occupational Risk Prevention and Organic Law 3/2007 on the Effective Equality of Women and Men (4).

Applied to delivery work on digital platforms, this perspective enables the identification of risks that remain invisible when adopting a neutral or androcentric approach to work organisation.

Risk assessment from a gender perspective implies analysing how working conditions, equipment used and algorithmic organisation affect women and men differently, as well as persons with gender diversity. In platform-based delivery work, this differentiation manifests itself in physical and ergonomic risks as well as in psychosocial and organisational risks.

These risks may be analysed by groups:

a) Physical and ergonomic risks
   - Forced or prolonged postures: continuous riding of bicycles or motorcycles may be more harmful to women if vehicles are not adapted to their physiology (size, strength, body proportions).
   - Heavy loads: From an ergonomic standpoint, work equipment—particularly delivery backpacks and certain vehicles—is often designed according to standards that do not take into account anthropometric diversity. This lack of adaptation increases the likelihood of musculoskeletal disorders among women, particularly affecting the lumbar and cervical areas and the shoulder girdle.
   - Menstrual cycle and pregnancy: platforms do not provide for additional breaks or guaranteed access to sanitary facilities, making the management of menstruation or pregnancy-related discomfort more difficult, thereby generating physical discomfort and stress. The absence of consideration of specific physiological factors such as menstruation, pregnancy or postpartum recovery evidences a work organisation that fails to adapt work to the individual, contrary to the preventive principles set out in Article 15 of the LPRL.

b) Psychosocial risks.
   - Violence and harassment: women may be subjected to sexist comments, verbal harassment or even physical aggression by customers, passers-by or co-workers, particularly in a male-dominated sector. This issue will be analysed in greater detail in a subsequent section.

- Double workload: many women assume domestic and caregiving responsibilities after their working day, resulting in increased stress and chronic fatigue.
- Isolation: women may feel excluded or undervalued in male-dominated work environments, hindering integration and social support, thus increasing psychosocial strain.
- Risks arising from the generational gap: women who are not digital natives may face difficulties in adapting to new technologies and communication methods, potentially leading to technostress (4).
- Risks linked to nationality: when migrant status is combined with gender, this may lead to increased discrimination and stigmatization.

c) Risks arising from work organisation.
- Extended or night working hours: unlimited working hours, typical of the platform model, may affect women more significantly, particularly when they must reconcile paid work with caregiving responsibilities.
- Mobility in unsafe areas: women experience both a greater perception of insecurity and a real increased risk during night-time journeys or when travelling through high-risk areas.
- Algorithmic management of work: the algorithm itself may introduce implicit biases that generate differential impacts according to gender. The automatic penalisation of breaks, disconnections or system-unjustified inactivity fails to recognise physiological and caregiving needs, affecting women more intensely.

d) Risks related to reproductive health.
- Pollution, vibrations or noise: constant exposure to these factors may affect fertility or have consequences for pregnancy development.
- Lack of access to adequate sanitary facilities or rest breaks: this represents a health risk, potentially leading to gynaecological and urinary infections, chronic stress, hormonal disturbances, etc.

Sexual harassment and harassment on grounds of sex as an occupational risk in delivery work

Sexual harassment and harassment on grounds of sex constitute recognised occupational risks that must be addressed within the framework of occupational risk prevention, as they may cause physical, psychological, sexual and economic harm to workers. In delivery work carried out through digital platforms, these risks acquire particular relevance due to the specific characteristics of service provision.

ILO Convention No. 190 defines violence and harassment as a range of unacceptable behaviours and practices that may occur once or repeatedly and that aim to, or result in, harm. This broad definition encompasses behaviours such as degrading comments, threats, sexual insinuations, unwanted touching, assaults and harassment, whether perpetrated by customers or third parties.

In delivery work, direct interaction with customers in private homes, the performance of deliveries at night and the absence of a controlled workplace environment increase exposure to sexual harassment and external violence. Labour precariousness and economic dependence on customer ratings aggravate this risk, as workers may refrain from reporting incidents due to fear of retaliation or algorithmic penalisation.

From an occupational risk prevention perspective, sexual harassment and harassment on grounds of sex must be subject to specific risk assessment, identifying risk situations and particularly exposed groups. Preventive planning must include the adoption of clear prevention and action protocols, confidential reporting channels, protection against retaliation and corrective measures against customers or third parties engaging in inappropriate conduct.

The employer's obligation to prevent sexual harassment is not limited to the formal existence of protocols; it requires their effective implementation, accompanied by specific training and awareness-raising measures. In the context of digital platforms, this obligation also entails adopting technological and organisational measures enabling the detection of risk situations, suspension of unsafe interactions and immediate protection of the worker concerned.

Recognising sexual harassment and harassment on grounds of sex as occupational risks reinforces the need to integrate a gender perspective into preventive management and to acknowledge that violence and harassment are not individual problems, but risks derived from work organisation that must be addressed structurally.

A gender perspective is essential to identify the greater exposure of women and LGBTQ+ persons to situations of sexual harassment, verbal violence and microaggressions. The provision of services in urban public spaces, constant interaction with customers and the absence of direct supervision increase vulnerability to such risks. Additionally, customer rating systems may reproduce gender biases and penalise behaviours that do not conform to social stereotypes.

The integration of a gender perspective into occupational risk prevention therefore requires risk assessments to identify these differentiated impacts and preventive planning to incorporate specific measures aimed at eliminating or reducing them, ensuring effective and non-discriminatory protection.

IDENTIFICATION OF RISKS IN THE LGBTQ+ GROUP

The LGBTQ+ group engaged in delivery work, in addition to the common risks affecting all workers, may be exposed to specific risks derived from discrimination or the invisibilisation of their identity. Furthermore, it must be taken into account that within this group the gender-specific risk mitigation measures identified for women must also be implemented, as the collective includes workers of different sexes and gender identities.

Specific psychosocial risks for LGBTQ+ persons (riders)

In addition to the risks identified for the general workforce, and in the case of female physiology for women, LGBTQ+ workers may experience specific risks linked to their sexual orientation, gender identity or gender expression.

Harassment and aggression on these grounds, both from customers and from co-workers.

Difficulties in accessing public sanitary facilities for non-binary persons. This difficulty may result in longer journeys without the algorithm recognising this circumstance, potentially interpreting it as reduced productivity.

Fear of making their identity visible, leading individuals to conceal it in order to avoid retaliation or offensive comments, which may result in chronic stress, anxiety and low self-esteem.

Organisational discrimination, such as the obligation to use a legal name that does not correspond to the worker's gender identity on labels, receipts or identification, generating discomfort and forced exposure.

Risks arising from the generational gap. LGBTQ+ persons who are not digital natives may face challenges in adapting to new technologies and communication methods, potentially leading to technostress.

Risks linked to nationality: when belonging to the LGBTQ+ collective is combined with migrant status, this may lead to increased discrimination and stigmatisation.

In summary, individuals belonging to the LGBTQ+ collective may experience differentiated exposure to certain occupational risks, particularly psychosocial risks and risks of external violence. In delivery work performed through digital platforms, constant interaction with customers and third parties, together with service provision in urban public spaces, increases the risk of discrimination, insults, threats or aggression motivated by sexual orientation, gender identity or gender expression.

The absence of direct supervision and the dependence on customer rating systems aggravate this risk, creating a situation of vulnerability in the face of discriminatory behaviour that may translate into algorithmic penalties. Fear of receiving negative ratings or being disconnected from the platform may deter workers from reporting harassment or discrimination.

Prevention – migrant rider workers

This subsection analyses the risks affecting this group of workers.
The majority of riders are legally resident migrants.

Within this group, three subgroups may be identified:

a) Legal migrants with adequate linguistic competence and literacy.
b) Legal migrants with limited or no linguistic competence or literacy.
c) Migrants in an irregular administrative situation, who may or may not possess linguistic competence or literacy. This group includes individuals who rent an account from another person who holds regular status.

This collective is susceptible to experiencing the same risks identified for other groups. However, particular problems arise in the second and third subgroups mentioned above, including risks derived from not understanding instructions or signage. This may result in longer delivery times, increased road traffic accident risks, and similar consequences.

Migrants in an irregular administrative situation face an even more precarious context. In addition to the risks inherent to the activity itself, they experience stress linked to legal vulnerability, more severe consequences in the event of accidents or illness due to the absence of company-provided health coverage, and heightened stress resulting from pressure exerted by the account holder. This often obliges them to work 12-hour days or longer in order to transfer between 40% and 50% of their earnings to the account owner (5).

Specific risks for senior workers

Older workers present specific occupational risks derived from physiological changes associated with ageing, such as reduced reaction capacity, loss of muscular strength and a higher prevalence of musculoskeletal and chronic pathologies.

In delivery work carried out through digital platforms, these factors increase the risk of road traffic accidents, falls and physical injuries, particularly when combined with high work intensity, prolonged working hours and pressure related to delivery times. The lack of adaptation of equipment and work organisation to the capacities of senior workers exacerbates these risks.

PREVENTIVE MEASURES TO BE ADOPTED IN DELIVERY WORK ON DIGITAL PLATFORMS

The adoption of preventive measures in delivery work carried out through digital platforms must be addressed from a comprehensive, structural and not merely reactive perspective. Occupational risk prevention cannot be limited to formal or individual actions, but must be integrated into work organisation, the design of technological systems and the business model of digital platforms, in accordance with Law 31/1995 on Occupational Risk Prevention and its implementing regulations.

Preventive measures must be oriented towards eliminating or reducing risks at their source, acting primarily on the organisational and structural factors that generate insecurity, precariousness and exposure to risk, with particular attention to the gender perspective and the protection of vulnerable groups.

Actions to reduce risks from a gender perspective

In order to prevent these risks, we recommend a series of measures to be adopted in addition to those already indicated for the general body of delivery workers (6).

These measures should be incorporated into occupational health and safety policies by companies and reflected within the platform algorithms, both for employed delivery workers and for self-employed workers, who constitute the majority in this sector.

The recommended measures are:

a) Mandatory Preventive Training with a Gender Perspective

Within the necessary OSH training actions for workers (men, women and non-binary staff), a specific section should be added covering:

- Awareness of gender inequalities and their impact on occupational health.
- Specific training on differentiated risks for women, including ergonomics, harassment and reproductive health.
- Training in inclusive language.

The implementation of these training measures should be facilitated separately for platform prevention managers and for workers (both employed and self-employed). It is recommended that these actions be delivered through short online learning modules, concise videos with direct and engaging infographics reinforcing key messages (clear, simple and brief), both at the beginning of the employment relationship and through refresher training.

In Spain, several public institutions have developed preventive training in the field of gender equality, notably OSALAN, the “Women and Occupational Health” Working Group of the Navarre Institute of Occupational Health, and at national level the National Centre for Working Conditions of the INSST. Their guides and activities may serve as models for implementing gender-focused training.

With regard to self-employed workers, who are responsible for their own self-protection, this training should be offered via eLearning platforms accessible to this group, with direct indications from the Prevention Service or the Platform regarding the need to complete it. A system for monitoring implementation and learning outcomes could be established, for example through surveys and knowledge tests. However, it would be important for legislation to determine the form and means of mandatory completion and certification.

It would also be important for the Platform to verify that the worker has completed this training so that algorithms may assign delivery tasks accordingly.

b) Protocols for Action in Cases of Harassment, Aggression or Discrimination
Protocols should include:

Information on labour rights and internal and external resources (labour inspectorate, equality representatives, etc.), which may be provided through online leaflets.

Implementation of effective channels for reporting and sanctioning any action that may constitute discrimination or harassment. In such cases, an action protocol should be implemented aimed at ensuring the safety and support of the worker throughout all relevant procedures, enabling them to file a complaint safely and anonymously.

In the case of self-employed workers, this process is more complex, but measures must be designed to ensure their protection, including facilitated access to an SOS button or other mechanisms that reduce such risks.

The implementation of these actions within the platform’s preventive policy should be followed by modifications to the algorithm incorporating a gender perspective.

PREVENTIVE ACTIONS TO MITIGATE RISKS RELATED TO DIVERSITY

The measures previously indicated are equally applicable to this group; however, they must explicitly incorporate a diversity perspective.

a) Mandatory Preventive Training with a Sexual Diversity Perspective
This preventive training must comply with Article 19 of the LPRL and include knowledge of the rights of LGBTQ+ persons, identification of LGBTQ+-phobic attitudes and risk situations, and content promoting awareness of structural inequalities affecting this collective, such as:

- Rights of LGBTQ+ persons in the workplace.
- Identification of LGBTQ+-phobic attitudes and risks.
- Action in cases of aggression, threats or harassment.
- Mental health and self-care in hostile contexts.
- Promotion of respect for diversity as a transversal value.

- Promotion of inclusive language as a tool to mitigate discrimination (7).

These measures could be implemented through short online informational modules, both at the start of the employment relationship and through refresher courses, including brief videos addressing each topic.

Materials should be concise and highly visual to enable workers to internalise key messages within minutes.
For self-employed workers, this training could be made available via virtual platforms, with follow-up mechanisms established through surveys, subject to legislative determination regarding mandatory completion and certification.

b) Protocols for Action in Cases of Harassment, Aggression or Discrimination

These should include:

- Information on labour rights and internal and external resources (labour inspectorate, diversity representatives, etc.).
- Implementation of effective channels for reporting and sanctioning discriminatory conduct or harassment.
- In such cases, an action protocol should be implemented through a committee that includes representation from the collective concerned, ensuring safety and support for the worker throughout the process, enabling safe and anonymous reporting.
- Conducting surveys enabling workers to anonymously identify risk areas.

For self-employed workers, this process is more complex, but political and legislative measures must be designed to ensure their protection, including access to an SOS button or other mechanisms to mitigate such circumstances.

Reformulation of the algorithm

Algorithms should incorporate preventive policy considerations. It would therefore be appropriate to carry out an evaluation of high-risk areas from an LGBTQ+ perspective, as well as areas with problematic access to sanitary facilities, and to include risk zones identified anonymously by workers.

c) Non-discriminatory organisational measures

- Legal recognition of social name.
- Updating documentation and training in inclusive language.

Preventive actions to mitigate risks for migrant rider workers

With regard to account rental practices, facial or biometric recognition systems should be implemented to prevent this illegal situation, ensuring that the algorithm does not allocate orders unless there is certainty that the person working is the legitimate account holder (5).

Mitigation measures and preventive actions should include:

- Accessible training and communication.
- Videos and visual pictograms in predominant languages (Arabic, Romanian, Urdu, Sub-Saharan languages).
- Oral instructions, in-person briefings or audio guides.
- Practical tests prior to commencing work to confirm understanding.

- Mobility protection.
- Practical training in safe riding/driving, urban signage and the use of cycle lanes.
- Work organisation.
- Guaranteeing mandatory rest days, maximum working hours and rotation systems to prevent fatigue.
- Support for regularising documentation status.
- Access to assistance and reporting mechanisms.
- A confidential line or system for reporting accidents without fear of retaliation.
- Information on labour rights and legal assistance with trade union mediation (e.g., Riders X Derechos).
- Accompaniment to healthcare centres and clarification of healthcare rights, even with minimal documentation.

Psychosocial measures should include:

- Group sessions addressing stress, anxiety and self-care resources.
- Dialogue spaces to share experiences and propose improvements.
- Monitoring and continuous improvement.
- Periodic field audits.
- Anonymous surveys to identify comprehension barriers.
- Incident analysis and proposals for improvement from the worker's perspective.

PREVENTIVE MEASURES SPECIFICALLY TARGETED AT SENIOR WORKERS

Preventive management of delivery work on digital platforms must specifically consider the situation of senior workers, understood as older individuals whose functional capacities may be affected by natural ageing processes. The adoption of specific preventive measures is essential to ensure effective protection of health and safety, avoiding uniform approaches that increase exposure to risk.

a) Work organisation

Adaptation of work organisation to the real capacities of senior workers. This involves reviewing work pace, delivery times and physical demands associated with delivery activity, avoiding the imposition of objectives incompatible with safe driving and healthy performance.

Algorithmic task allocation systems must incorporate age and functional capacity criteria, enabling order distribution that considers experience and physical limitations, without resulting in economic or reputational penalisation.

b) Work equipment

Ergonomic adaptation of equipment and tools. Delivery backpacks should allow personalised adjustments reducing physical load and enabling balanced weight distribution, minimising musculoskeletal overload.

Vehicles used for delivery should be selected according to stability, comfort and ease-of-use criteria, reducing exposure to vibrations, impacts and forced postures. Ergonomic adaptation contributes to injury prevention and to prolonging working life under safe conditions.

c) **Specific occupational road safety measures**
Reduction of time pressure for deliveries. Although senior workers generally possess greater driving experience, they may experience reduced reaction capacity and visual acuity. Therefore, specific road safety measures must be adopted, including limiting order allocation during high-risk time slots such as night-time or adverse weather conditions.

The incorporation of driver assistance systems, risk alerts and age-adapted road safety training constitutes an effective preventive measure to reduce accident rates.

d) **Health surveillance and early risk detection**
Health surveillance must focus on the early detection of musculoskeletal, cardiovascular and visual pathologies that may affect safe performance of delivery work. This surveillance must respect confidentiality and avoid any discriminatory use of health information.

Health surveillance results must be used exclusively for preventive purposes, enabling adaptation of working conditions and task allocation to the capacities of senior workers.

e) **Preventive training adapted to age**
OSH training aimed at senior workers must be adapted to their characteristics and needs, using practical methodologies, clear content and accessible formats. Training should specifically address the prevention of musculoskeletal disorders, occupational road safety and the management of physical and mental fatigue.

The experience accumulated by senior workers may also become a valuable preventive resource, promoting their participation in awareness-raising activities and the dissemination of good preventive practices.

Measures against age discrimination

Occupational risk prevention must incorporate measures to prevent age discrimination and promote an inclusive and safe working environment. Adapting working conditions to age must not result in exclusion, economic penalisation or disconnection from the platform.

Preventive management must aim to ensure equal treatment and effective health protection, recognising age diversity as a factor to be integrated into work organisation.

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Part 3: Safety learning from solutions

11 Improving Transparency and Autonomy for Delivery Workers in Finland

How a Platform can improve Transparency and Autonomy for Food Delivery Workers

Laura Seppänen

Abstract— Transparency of algorithmic platform operations affects workers' autonomy and agency. Autonomy increases motivation and engagement at work, which in turn affect occupational safety and health. This chapter examines how food delivery platforms can increase autonomy for platform workers by revealing algorithmic principles in task allocation and ranking, increasing transparency about orders, and improving communication between workers and the platform. OSH actors could instruct platforms to pay attention to transparency and communication to and with platform workers. Making algorithmic practices of the platform publicly available and transparent may benefit not only workers but also other stakeholders such as policy makers and inspectors.

Keywords— Algorithmic management, autonomy, platform work, food delivery, transparency.

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., 2012). 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. This capacity to act is also called agency, which means "a temporally constructed engagement by actors of different structural environments" (Emibayer and Mische, 1998, p. 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 & 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). Structural work environments differ in how much they enable autonomy to actors such as platform workers. For simplicity, here we use the word autonomy also for agency.

Despite its apparent risks, platform work is often considered to provide workers more autonomy than traditional employment relationships. This is because on digital platforms, compared to 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 (Huws, et al., 2018; Ropponen et al., 2020). Autonomy, flexibility and freedom often motivate workers to do platform work (Pesole 2018; Schor, 2020; Wood et al., 2019).
One important aspect that conditions worker autonomy is transparency. Digital labour platforms are predominantly characterized by their information and communication technologies and algorithmic management (Wood, 2021). In principle, digital technologies have the capacity to radically increase transparency. In this chapter, transparency 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 autonomy – their capacity to make informed choices and to have alternatives for action – in the platform environment. It is useful for actors in occupational safety 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 show evidence about how food delivery platforms can increase autonomy for workers by improving transparency. However, the findings show that despite increased transparency, food delivery workers still experience opacity and effects of piece-rate payment system that limit their autonomy, which in turn may increase OSH risks. Examples of opacity and platform mechanisms increasing OSH risks are shown and discussed in the chapter 8 of this volume.

Based on Seppänen (2024a and 2024b), this chapter describes positive examples of how food delivery platforms have increased transparency for workers in their practical work. It is also shown that these transparency-enhancing practices indeed have increased food delivery workers' autonomy, which may decrease risks of occupational health and safety (OSH).

The data consist of eight qualitative thematic interviews with food delivery couriers and one platform company manager living and working in Finland. The interviews were conducted in 2021 and 2022.[4] The interview guide focused on platform workers' experiences with their work, how the platform shapes their work activities and the role of platform work in their career and life.[5] The two food delivery platform companies are described in chapter 8 and chapter 12.

The next section details the concepts of autonomy and transparency. Subsequently, Section 3 describes the findings on how transparency affect couriers' autonomy. The importance and role of transparency and autonomy in platform work, and the implications for OSH policy makers and practitioners are discussed in Section 4.

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

BACKGROUND: AUTONOMY AND TRANSPARENCY

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 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, p. 37-38). Autonomy increases motivation and engagement at work, which in turn affect safety, including injuries and accidents at work, sicknesses, and mental health (Ropponen et al., 2020, p. 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. In other words, technology-induced increased perceived 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., 2020; Sevchuk et al., 2019). Platform workers may see these efforts as part of their autonomy, without seeing the possible negative effects to their health and safety. The efforts of working long days and unpaid hours can be perceived as voluntary even in cases where workers are dependent on income from the platforms.

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, and what is the demand situation for their work. Workers' knowing requires that platform companies make necessary information transparent to platform users – transparency thus becomes a resource that increases workers' autonomy.

Transparency and opacity

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 in 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 (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 & 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 & 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, p. 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, p. 133-134). For organizations, strategic opacity can be a way to simultaneously comply with expectations and hide important information. (Stohl et al, 2016).

In this chapter, we will investigate those algorithmic practices of delivery platforms that can enhance worker autonomy and thus diminish OSH risks. Transparency means that platform workers can see – or not see in the case of opacity – information (such as text, picture or video, figures or oral information or clarifications) that increase their autonomy, 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.

INDUSTRY EXPERIENCE WITH TRANSPARENCY TOOLS

The delivery platforms offer 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 can work as much or as little they want, but in practice, competition between couriers, possible rating 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). The mismatch between the promise of freedom and its practical limitations is the autonomy paradox discussed earlier.

Revealing algorithmic principles in task allocation and ranking

Platform B makes transparent to couriers three principles for how orders are matched with couriers logged on the platform app (task allocation): 1) Location (a courier's proximity to the pick-up location); 2) The vehicle the courier is using (bicycle or car), and 3) Availability (courier is online and not making another delivery at the moment). The last principle diminishes traffic and vehicle risks and can be called "lenient algorithmic management" (Kusk & Bossen, 2022). Making these principles transparent substantially helps couriers' autonomy in planning their working practices. Here is another example of lenient algorithmic management: couriers are not controlled (rated or ranked) by their speed or activeness, which basically increases autonomy and may improve their OSH. But, because couriers are paid by tasks, the incentive for speed and haste is still there.

Moreover, some couriers on platform B are not aware of these principles, especially the couriers with short work histories with food delivery platforms. Many couriers would like to know better, how the task allocation algorithm works. We can interpret this situation as a transparency paradox where, despite good communication, receivers do not find the information they need. This suggests the importance of communication, training and couriers' self-management.

As explained in chapters 8 & 12, platform A ranks couriers to certain levels based on their performance scores. Couriers with good performance, and thus ranked highly, can choose the most lucrative work 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 said: *"So if all your points [of] working performance point to something very good, then you have enough working shifts."* Platform A informs couriers about the basic logic of the rankings and the performance criteria based on which they are rated. 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 autonomy and can influence their ranking through performance. One of them argued: *"Well, it [ranking] seems fair to me, because there is the system of levels, so you can yourself influence what level you are on"*. This ability to influence one's ranking is a positive outcome of the platform making transparent the evaluation criteria for couriers.

However, despite criteria in rating and ranking are made transparent, couriers are often unaware of reasons behind task allocation or ranking The platforms may flexibly regulate the number of couriers at each ranking level or the intake of new couriers to the platform, which causes uncertainty about tasks and income, and thus stress, to couriers (see also chapter 8 in this volume). Despite transparency and lenient algorithms, risks remain.

More transparency about orders

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' autonomy 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 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. Besides a task-based payment, couriers get some compensation for riding or driving distances. As one of the couriers argued:

It [order's payment estimation on the app] 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 seeing the income from orders in advance, the payment estimation could help couriers in their selection of tasks and thus their autonomy. However, the platform tied this new positive transparency feature together with a renewal of their freelancer contract. Couriers would only obtain this feature in their app if they accepted a new contract with conditions that were worse than in their actual contract. This can be an example of a "strategic opacity" (Seppänen, 2024a; 2024b). Also on platform B' app, couriers can see various details after each gig, e.g. the name of the restaurant, time, distance and the payment estimation from each order.

Communication between couriers and the platform

The platform can assist couriers in finding the customers' homes, because platforms can see couriers' activities and their geographical locations. This means that dispatchers can be of help for couriers in case of vehicle and traffic safety questions. Throughout the data, couriers consider this as a positive help from the platform rather than control or surveillance.

Platform B has put effort to improving communication with couriers. They can constantly see the demand situation on their app, which assists them in choosing working times. Good communication not only helps working but also gives a feeling of being a respected worker. Whenever couriers have questions, they can email to the platform who also sends weekly newsletters. Couriers can rate each message they get from platform representatives. Platform B informs actively couriers about traffic jams, demonstrations or other acute conditions.

Courier: Yeah, it's easier than like, because you just send the message and then they reply. Like sometimes, if they're too busy they may take a little bit time, but usually they reply fast. And they are always like upgrading it like, making it easier to send a message and everything.

In the algorithmic management of the platform, it is obvious that communication between the platform and couriers is mediated through feedback and data. The manager of platform B views their data collection like this:
With three-month intervals a survey is sent to all our couriers globally, asking how satisfied you are with payments, how satisfied you are with the platform company, how satisfied you are with the amount of gigs you get, how is the app functioning, how is the personnel of restaurants and shops, and so forth. Then our workers analyse and react to them in each country.

We can see that these courier surveys are motivated by platforms' interest in couriers' satisfaction in their work and with their platform. Surveys and asking for feedback are taken positively by couriers, but they lack knowledge how their feedback might have an impact, if any. Therefore, as the next quote tells, communication lacks transparency about the use of feedback data.

Courier: Yeah, like you can give feedback but I don't know how they are using that feedback. But they always send like weekly, newsletter also, and then of those things, also they tell like if you have any questions or anything, email to this email address. Like, and feedback. I don't know how they use that feedback after then.

Collecting feedback data is a way to make couriers voice transparent to the platform. It is possible that this feedback data may have an impact on platform's practices. For instance, the feedback data could possibly be collected and used to improve OSH. The platform does not make transparent to couriers, how the data is used and with what impact.

Transparency report

The opacity of algorithmic management is a well-known problem (Ananny & Crawford, 2018; Rahman, 2021; Rahman et.al., 2024; Stohl et.al., 2016). Platform B has published a publicly available transparency report about its algorithms. This means that not only couriers, but also other stakeholders such as regulators or inspectors can access this information. However, the report does not fully display the platform's algorithmic management.
Platform companies A and B have improved the algorithmic properties during years 2017-2022, and many of these improvements are benefiting couriers and their working. The food courier interviews suggest that these delivery platforms have, through technology, considerably increased transparency and thus autonomy for couriers.

CONCLUSION AND DISCUSSION

In this chapter we have examined positive examples of how transparency on the platform increases workers' autonomy, which may alleviate OSH risks. Analysed with interviews of seven couriers and of one platform manager, the findings show that food delivery platform companies in Finland have improved the algorithmic properties of their platforms, and many of these improvements are benefiting couriers and their working. The platforms have, through technology, considerably increased transparency and thus autonomy for couriers. Besides revealing main algorithmic principles, the platforms have improved transparency about each order offered to couriers, such as final customer's address and a payment estimation from each order that was offered to couriers. Communication between couriers and the platform is substantial for transparency to take place. It can take place directly through the app and emails, but also through feedback from couriers, which has potential for improving platform practices. OSH actors could instruct platforms to pay attention to transparency and communication to and

with platform users (Seppänen et al., 2022). Finally, making algorithmic practices of the platform publicly available and transparent may benefit not only couriers but also other stakeholders such as policy makers and inspectors.

The findings suggest that the kind of transparency described here gives platform workers autonomy and enables them to make more informed decisions, thus influencing their way of working. Autonomy increases motivation and engagement at work, which in turn affect safety, including injuries and accidents at work, sicknesses, and mental health (Ropponen et al., 2020, p. 59). Especially workers who are dependent on income from platforms are in a vulnerable position (Schor, 2020). The fairness experience produced through transparency may help workers tolerate negative features of platform work (Fieseler et al., 2019).
Despite increased transparency, the findings show that platform workers are still confronted with opacity and uncertainty (Perkiö et.al., 2023; Rahman 2021; chapter 8, this volume). Labour platforms may keep their algorithmic systems opaque for reasons of confidentiality or because users might otherwise game the system (Cedefop, 2020, p. 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, p. 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. Transparency paradox here means that platform workers need to know the platform logic and mechanisms, but platforms still hide them, at least partially. Transparency paradox is also produced, if a beneficial feature is attached to another less beneficial change. The consequences of the transparency paradox for platform workers are uncertainty, stress and a need to maintain a critical attitude to and investigate changes coming from labour platforms (Ropponen et al, 2020). Transparency requires a critical audience both inside and outside organizations (Kemper & Klokman, 2018), and OSH practitioners can play an important role in this regard.

The OSH risks are affected by workers' experiences of autonomy, and the autonomy paradox helps us understand the puzzle from workers' own perspective. Autonomy paradox is between the expectation and promise of freedom and flexibility, and the real experience of time use: Having to work long days to improve one's rating and ranking, spending unpaid time in waiting or following the demand situation, and working at unsocial hours, thereby increasing health and safety risks. The practical outcomes of autonomy and transparency paradoxes for platform workers may be useful when the transparency measures of the EU Directive (2024/2831) on improving working conditions in platform work will be applied and implemented in the member states. The transparency paradox may aggravate the autonomy paradox by limiting platform workers' ability to see and know crucial information that shapes their autonomy and affects their work, income and well-being.

The role of transparency should not be overestimated. For instance, transparency does not in itself affect the crucial question of income. The low level of remuneration, the task-based payment, and rating and ranking systems all encourage platform workers to increase efficiency, with haste and stress as outcomes. Transparency does not compensate for safety training, poor insurance systems or preventive OSH practices. Too much emphasis on transparency may hide other important factors affecting OSH. That said, transparency is still very relevant because, as we have seen, it may help workers' own autonomy in terms of self-management, self-regulation, and safety learning. 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.

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12 Enhancing OSH through Algorithmic Management in the Netherlands

Enhancing Occupational Safety and Health Through Algorithmic Management: Lessons from Platform Delivery Work

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Abstract— Algorithmic management (AM) could potentially be used as a solution to improve safety for delivery workers. The AI and data science techniques we have outlined show AM can be applied in different ways to contribute to bolstering the safety of delivery workers. We interviewed three experts in the area of Occupational safety and health (OSH), digital solutions, AM and/or the combination of the three. Their responses reflected the hopeful new conclusions that AM could be utilized to improve OSH for platform workers, but also reflected that the solutions really need to prioritise workers OSH rather than the efficiency of the business.

Keywords— Platform Work, Algorithmic Management, Solutions, Occupational Safety and Health, Delivery Workers.

INTRODUCTION

Traditionally, technological innovations were implemented to replace or support physically demanding, repetitive tasks, with the dual aim of primarily increasing organisational efficiency but also, to a more minor degree, improving occupational safety & health (Fernández-Macías et al., 2023). In the context of platform work, these organisational functions are increasingly carried out through algorithmic management (AM) systems, making it crucial to conduct research that examines the ethical consequences of AM and the labour conditions these systems generate (Leicht-Deobald et al., 2022).

A growing body of research examines how AI-based technologies can be used to support safer behaviour in the workplace. Although such technologies are not always explicitly framed as AM, many rely on mechanisms associated with AM, including worker monitoring, data collection, analysis, and feedback. For example, Gal et al. (2020) discuss the use of fine-grained people analytics to improve worker engagement, while Zoomer et al., (2022) examines the use of camera systems to monitor personal protective equipment (PPE) use. These examples point to a broader interest in evaluating how AI-based and AM-related technologies

can be designed to improve OSH. For delivery workers, safety is a particularly pressing concern as they frequent busy roads and unpredictable traffic conditions. Nevertheless, research suggests that increased organizational involvement and implementation of control measures can enhance road user behaviour, even in high-stress situations (Rosenbloom, 2022).

The relevance of AI-based systems for OSH is also reflected in recent work by The European Agency for Safety and Health at Work (EU-OSHA), who published a set of eight case studies exploring the successful implementation of artificial intelligence (AI)-based systems for task automation with a specific focus on safeguarding worker wellbeing (EU-OSHA., 2023). The cases encompass a diverse range of application areas, such as, lifting, product inspection, trenching, visual recognition, inspection of gas and oil infrastructure, fact checking, AI-material quality control measures, and inspection of worksites of gas infrastructure operator. Together, these examples show that AI-based technologies are already being explored across different work contexts as tools for improving safety and wellbeing. Building on this broader interest, the following section considers how selected algorithmic and AI-based solutions could be applied specifically to platform delivery work.

This paper examines how AM and related AI-based technologies could be redesigned to improve OSH among platform delivery workers, and what conditions are necessary for such systems to be worker-centred rather than productivity-driven.

New solutions

Building on the broader interest in AI-based technologies for OSH, this section reviews three categories of AM-related solutions with potential relevance for delivery worker OSH. The focus is on solutions that are, in principle, compatible with the digital infrastructure through which platform work is already organised and managed.

Accident detection with sensors

One of the main safety risks for delivery workers is the possibility of bicycle or traffic accidents, which may result in falls, collisions, or serious injury. In such situations, timely assistance is crucial, particularly when a worker is incapacitated and unable to seek help independently. Accident-detection technologies could therefore play an important role in improving post-accident support by alerting platform companies when an accident is likely to have occurred. This would enable the platform to contact the worker directly and, where necessary, dispatch nearby delivery workers or emergency services.

Sensor-based technologies offer a promising way to detect bicycle accidents among delivery workers. These sensors can be integrated into bicycles or protective equipment, such as helmets, to identify movement patterns that may indicate a fall or collision. For example, Tabei et al. (2021) found that handlebar-mounted sensors could reliably recognise bicycle accidents, detecting them with 95.2% accuracy. This suggests that sensor-based accident detection could be a feasible way to improve post-accident support for delivery workers.

Accident detection may also be possible without the instillation of sensors or specialised hardware in the bicycles or PPE. Smart phones can already collect relevant information, such as location and movement patters, which could be utilized to detect potential crashes. Candefjord et al. (2014) found that smartphone-based crash detection can reliably detect cycling accidents while limiting false positives. This suggests that platform companies could

integrate accident-detection features into their existing AM applications, since delivery workers already carry smartphones as part of their work.

Hybrid AI and Enterprise Resource Planning Software (ERP)

ERP, adaptive automation, and hybrid AI can be understood as complementary approaches for redesigning AM so that it better accounts for workload, worker capacities, and safety-relevant contextual information.

Current forms of AM can push delivery workers into stressful work situations, particularly when task allocation and performance targets are primarily optimised for speed and efficiency. In many cases, these systems give limited consideration to the short- and long-term health and safety consequences for workers. However, this also points to an important opportunity: the same algorithmic systems that structure delivery work could be redesigned to incorporate human factors and OSH considerations. When integrated with Enterprise Resource Planning (ERP) software, such systems could help balance organisational demands with safer workload planning, supporting both operational needs and workers' OSH rights.

A particularly relevant approach is adaptive automation, which refers to systems that can adjust to the capacities, pace, and needs of individual users (Steijn et al., 2016). In the context of platform delivery work, this would mean designing algorithms that adapt to workers' needs and OSH rights, rather than requiring workers to continually adjust to the demands of the algorithm. Such an approach shifts responsibility toward system designers and platform companies, who can structure work in ways that reduce intensity and prevent overload. This aligns with findings from EU-OSHA (Irastorza et al., 2016), which emphasise that psychosocial risks of workers are most effectively addressed through changes in work organisation, rather than by placing responsibility solely on individual workers.

More broadly, ERP systems could be combined with AI functionalities to include safety-relevant knowledge in the organisation and management of delivery work. Hybrid AI is particularly relevant here because it brings together machine-based analysis with human knowledge and contextual information, supporting faster understanding of a worker's surroundings and more informed decision-making (Meyer-Vitali et al., 2019). For example, Uber Eats' navigation system has been criticised for being designed around car routes rather than bicycle routes, which can lead riders into unsafe situations, such as being directed onto highways (Defossez, 2022). A hybrid AI approach could help address this by integrating route data with worker knowledge and real-time contextual information, such as traffic congestion, to guide delivery workers toward safer and less congested routes.

Taken together, these approaches point toward a more worker-centred form of AM, in which organisational planning, adaptive system design, and contextual AI are combined to support safer workload allocation and decision-making.

Gamification

Gamification is described as the design approach of implementing elements familiar from games to contexts where they are not commonly encountered (Warmelink et al., 2020). This may refer to game mechanics, game technologies and/or game economics (affordances). The integration of gamification within the workplace involves converting work tasks into engaging puzzles and/or challenges, often through scoring systems that track progress and reward

specific behaviours. For delivery workers, this can enable workers to accrue points, badges, and other forms of virtual incentives (Kim & Werbach., 2016 Eyert et al., 2022). Similarly, Kumar (2013) found that gamified elements such as points, leaderboards, badges, and avatars can enhance worker engagement by increasing both intrinsic and extrinsic motivation. Additionally, gamification has proven to be effective in various sectors, including education, health, and sustainability (Koivisto and Hamari 2019., Connolly et al., 2012;
Deterding et al., 2011; Oinas-Kukkonen and Harjumaa, 2018).

Delivery platform applications have previously incorporated gamification elements into their AM systems, including examples from Lyft (Mason, 2019) and Deliveroo (Van Doorn, 2020). These features are not necessarily designed around worker safety, but often function as mechanisms for encouraging particular forms of worker behaviour. For instance, platform apps may use visual indicators, achievement displays, status levels, or map-based prompts to highlight earnings, rewards, or locations with higher demand. Such features can motivate workers to accept assignments at particular times or in particular areas, illustrating how gamification can be used to steer labour within platform-based AM systems (Rosenblat, 2021).

Building on these existing uses, gamification could also be redirected toward improving delivery worker safety in several ways:

- Feedback and learning: Gamification elements can be used to provide immediate feedback to drivers when they make a safety mistake. This can help drivers learn from their errors and make corrections more effectively.
- Competition: Friendly competition among colleagues could be introduced through leaderboards that allow delivery workers to compare safety records, potentially motivating safer driving practices.
- Reward systems: Reward mechanisms are already used in some delivery platform apps to highlight worker achievements, customer compliments, or status levels. However, these mechanisms could be redesigned to prioritise safety by recognising workers who demonstrate safe behaviours or meet safety-related targets.

In their review of motivational technologies in transportation safety, Wallius, Klock, and Hamari (2022) found that gamification elements were generally associated with favourable outcomes in promoting safer driving behaviours. The review also identified additional positive outcomes, including knowledge acquisition and retention, as well as psychological benefits such as perceived learning, persuasiveness, instructional effectiveness, satisfaction, and attitude change. Similarly, Wallius and Hamari (2020) found support for the use of gamification as a means of improving safety in the transportation sector. However, they also noted that most existing research focuses on single-player gaming approaches, whereas safety often depends on interaction, teamwork, and communication between different actors. Future research should therefore pay greater attention to the social dimensions of gamification and how these influence safety behaviour. In this context, carefully designed competition and reward systems may be useful, provided that they support collaboration and safe behaviour rather than adding pressure or encouraging risk-taking.

METHODS

This section outlines the methodology used to address the research objectives of this chapter. It describes the approach taken to collect, analyse, and interpret data in order to examine how selected algorithmic systems could contribute to improving the OSH of platform workers, with a specific focus on delivery drivers.

Participants

Three experts were recruited through purposive sampling based on their expertise in one or more of the following domains: OSH, AI and digital technologies, AM, and platform work. The aim was to gather informed expert perspectives on the potential of AM to support worker safety, health, and wellbeing. Together, the participants represented complementary areas of expertise, enabling the study to capture both technological and OSH perspectives. Participation was voluntary, and all participants were provided with information about the aims of the study, data handling procedures, and confidentiality arrangements prior to the interviews

Materials

Data were collected through semi-structured interviews. An interview guide was developed based on findings from the preceding literature review and included questions on perceived opportunities for improving OSH through AM, technological solutions that could support safer work practices, barriers and risks associated with implementing such solutions, and the feasibility and acceptability of proposed interventions for platform workers.
The semi-structured format enabled a consistent discussion of key topics while allowing participants to elaborate on issues within their particular area of expertise.

Procedure

Individual semi-structured interviews were conducted with the participating experts. During the interviews, participants were asked to reflect on the literature findings and discuss potential AM solutions that could improve occupational safety and health among delivery workers. Particular attention was given to technologies and organisational approaches that could reduce risk exposure, improve worker support, or enhance safety-related decision-making.

Interviews were recorded and subsequently analysed using a thematic analysis approach. The transcripts were reviewed repeatedly to identify recurring patterns, ideas, and recommendations. Codes were developed inductively from the data and subsequently grouped into broader themes representing the experts' views on promising AM solutions and the conditions required for their successful implementation.

RESULTS

The analysis of the three expert interviews identified three recurring themes that correspond partly, but not entirely, to the technological and organisational approaches discussed in the preceding sections: gamification, hybrid AI and adaptive algorithmic systems, and application redesign and additional governance tools. The first two themes were closely aligned with topics covered in the literature review, while the third theme emerged inductively from the interviews. In other words, application redesign and worker-centred governance were not initially treated as a separate solution category, but became visible during the analysis because participants repeatedly connected OSH improvement to issues such as fairer review systems, reduced monitoring, worker feedback channels, and alternative or successor platform models. Across these themes, participants evaluated not only whether these approaches could improve OSH in platform delivery work, but also under what conditions they would be beneficial. A recurring concern was that algorithmic solutions should be designed around worker wellbeing and safety, rather than primarily around productivity, efficiency, or customer demand. Although accident

detection was discussed in the literature review, it did not emerge as a major interview theme. Experts focused more on prevention, workload, autonomy, and platform governance than on post-accident response. It is therefore treated as a relevant technical option from the literature, rather than as a central theme from the interview data.

Gamification as safety learning and behavioural feedback

Participants discussed gamification as a potential tool for improving delivery worker safety by supporting learning, feedback, and awareness of risk. Rather than presenting gamification as a solution in itself, participants emphasised that its value depends on how it is designed and what behaviours it rewards. Gamified tools were seen as potentially useful for training specific safety-related behaviours and making safety information more engaging. For example, one participant noted that gaming elements could be used “to train the exact behaviour that you want from the drivers,” while another suggested that gamification could help make delivery workers “more aware of dangerous situations.”

Participants also saw value in using gamification to create controlled environments in which workers could practise decision-making and explore the consequences of different choices. One participant explained that gaming can be effective when workers are able to “experience scenarios or some dilemmas,” particularly because people may know what the main safety risks are but still fail to act on this knowledge in practice. Similarly, another participant noted that gaming can help workers “make decisions and see their effects and the dilemmas that will happen in the real world.” These responses suggest that gamification may be most useful when it is applied as a learning and reflection tool, rather than as a simple reward mechanism.

At the same time, participants raised concerns about gamification when it is used to increase productivity or commitment to the platform rather than to improve worker safety. One participant referred to existing research on gamification for job satisfaction and productivity, but noted that this approach may align more closely with management interests than with worker protection. This concern was also reflected in comments about reward systems, where participants suggested that platforms should be transparent about why rewards are given and should include a more human element in feedback. Overall, the findings suggest that gamification may support OSH when it rewards safe practices, encourages learning, and increases risk awareness, but could be problematic if it creates additional pressure, competition, or productivity-focused incentives.

Hybrid AI and adaptive systems for contextual decision-making

Participants also discussed the potential of hybrid AI and adaptive algorithmic systems to make AM more responsive to the realities of delivery work. A key theme was that these systems could improve the quality and explainability of algorithmic instructions. One participant described hybrid AI as a technique that is still “in its infancy,” but suggested that it could improve AM by making instructions more explainable and preventing unreasonable instructions. This was linked to the idea that a route or timetable may appear reasonable under normal conditions but become unsafe or unrealistic when contextual factors, such as traffic congestion, are taken into account.

Route planning was frequently discussed as an example of how algorithmic systems could better support safety. Participants noted that workers sometimes rely on external navigation applications because the platform’s own app does not adequately support safe routing. One

participant suggested that algorithms in other applications, such as Google Maps, may better foster worker safety because they allow users to select route preferences or avoid unsafe conditions. This indicates that safer AM may require platform applications to integrate contextual information, such as traffic, route type, congestion, and worker preferences, rather than relying only on efficiency-oriented task allocation.

Participants also connected adaptive algorithmic systems to workload and rest. Several comments highlighted that delivery workers may face long periods without breaks, including workers with health conditions such as asthma. Participants suggested that redesigned applications could include prompts that encourage workers to take breaks or respond to tasks at a safer pace. Importantly, one participant stressed that such systems should regulate companies rather than add additional pressure on workers. This indicates that adaptive systems should not simply monitor workers more closely, but should be used to redistribute responsibility toward platform companies and support safer work organisation.

A further aspect of this theme concerned worker input and bottom-up adaptation. Participants argued that current platform applications often provide limited opportunities for workers to explain why they decline particular tasks, including for safety reasons. Adaptive systems could address this by enabling worker feedback, changing prompts, and incorporating bottom-up input into future decisions. One participant emphasised that solutions should conform to the worker rather than requiring the worker to conform to the algorithm, stating that “the body should remain in control of any such technology.” Taken together, these findings suggest that hybrid AI and adaptive systems may improve OSH when they make algorithmic decision-making more contextual, explainable, and responsive to worker needs.

Application redesign and worker-centred governance

The third theme concerned broader changes to platform applications and the development of additional tools or governance models to support workers. Participants identified several areas where platform systems could be redesigned to improve fairness, reduce unnecessary monitoring, and give workers greater control over their working conditions.

Fairness in customer-worker interactions was a recurring issue. Participants noted that customer reviews can have important consequences for workers, but may be based on factors outside the worker’s control. One participant referred to the Reputation Agent as an example of a tool that encourages fairer reviews by prompting customers to consider the implications of their assessments. Another participant suggested that platforms should take stronger action when customers repeatedly behave poorly toward delivery workers. These comments indicate that worker safety and wellbeing are not only affected by task allocation and routing, but also by how platforms govern interactions between workers, customers, and restaurants.

Participants also raised concerns about monitoring. One participant suggested that platforms could reduce unnecessary surveillance by sharing only summaries of data with managers, or by using algorithms to flag exceptional cases rather than continuously exposing detailed worker data. This points to an important distinction between using data to support safety and using data to intensify control. From an OSH perspective, participants appeared to favour approaches that minimise intrusive monitoring while still enabling appropriate responses to serious safety-related incidents.

Finally, participants discussed additional governance tools and worker-led alternatives. These included cooperative platforms, successor systems that exist alongside existing platforms, and tools such as Turkopticon that give workers more information about the people or organisations requesting their services. Such examples were presented as ways of giving workers more control over their choices when it is not possible to change the platform itself. Participants therefore framed OSH improvement not only as a matter of technical design, but also as a question of governance, transparency, and worker voice.

Overall, the interviews suggest that AM and related technologies could contribute to improving OSH in platform delivery work, but only if they are designed and governed with worker wellbeing as the central objective. Across the three themes, participants emphasised that algorithmic systems should be used to support learning, contextual decision-making, fairer interactions, and safer workload organisation. The findings therefore indicate that the potential of AM lies not simply in introducing new technologies, but in redirecting existing algorithmic infrastructures toward more worker-centred forms of platform management.

DISCUSSION

The findings suggest that AM has the potential to contribute to OSH in platform delivery work, but only when the systems are deliberately redesigned around worker well-being rather than productivity, efficacy or customer demand. The interviews revealed that AM should not be rejected per se, but rather there should be an emphasis that its potential depends on worker's needs, bodily limits, and safety concerns that are embedded into the design and governance of platform systems.

Gamification: safety support or behavioural control?

The findings show that gamification could support safety when it is used to promote learning, feedback, and risk awareness. This aligns with research suggesting that gamification and motivational technologies can contribute to safer driving behaviours and other positive learning outcomes in transportation safety (Wallius et al., 2022; Wallius & Hamari, 2020). In this context, gamification may be useful for making safety information more engaging, supporting scenario-based learning, and helping workers reflect on the consequences of particular choices.

However, the expert interviews also reinforce the need for caution. Gamification is not inherently worker-centred, and existing research shows that it can be used by platform companies to optimise and control labour (Van Doorn & Chen, 2021). When gamified elements reward speed, availability, or acceptance rates, they may increase pressure on workers rather than improve safety. This is particularly relevant for delivery workers, whose working conditions already involve time pressure, customer ratings, and algorithmic performance management. Therefore, safety-oriented gamification should avoid reinforcing productivity-driven incentives and should instead reward behaviours that genuinely support OSH, such as safe route choices, adequate rest, and participation in safety learning.

This means that gamification should be evaluated not only in terms of whether it increases engagement, but also in terms of what kind of engagement it produces. If designed poorly, competition, leaderboards, and reward systems could encourage comparison, stress, or risk-taking among workers. If designed carefully, however, they may support collaborative learning and safer practices. Worker wellbeing and mental health should therefore be central design criteria for any gamified intervention (Johnson et al., 2016; Bräuer and Mazarakis, 2019).

Hybrid AI and adaptive systems: from efficiency to contextual safety

The findings also suggest that hybrid AI and adaptive algorithmic systems could help shift AM from efficiency-driven control toward more contextual and safety-relevant decision-making. This is supported by literature that positions hybrid AI as a way of combining data-driven learning with symbolic or knowledge-based reasoning, thereby improving the robustness and interpretability of AI systems (Marcus, 2020). In the context of platform delivery work, this is important because delivery workers operate in dynamic environments where route safety, traffic congestion, weather conditions, worker fatigue, and the physical demands of cycling can change quickly.

Hybrid AI may therefore be particularly useful for improving route planning and instruction quality. Participants noted that a route or timetable may appear reasonable under normal conditions but become unsafe or unrealistic when contextual factors, such as congestion, are taken into account. This concern is reflected in Defossez's (2022) observation that some delivery navigation systems have been designed around car routes rather than bicycle routes, which can lead riders into unsafe situations. By contrast, hybrid AI approaches, such as those discussed in relation to Google Maps, combine deep learning with knowledge-based systems to offer route alternatives and contextual information, including traffic conditions and estimated travel times (Dickson, 2020). Integrating similar features into platform applications could allow delivery workers to choose routes that better balance efficiency with safety.

The interviews also suggest that adaptive systems could support safer workload management by taking account of workers' capacities, work duration, and need for rest. Rather than expecting workers to adapt continuously to algorithmic demands, platform systems could be designed to adjust prompts, timelines, and task allocation in response to worker needs and OSH considerations. This links back to adaptive automation, which emphasises the importance of systems adapting to users' capacities and preventing overload (Steijn et al., 2016). However, such systems should not become another layer of surveillance. Their value for OSH depends on whether they redistribute responsibility toward platform companies and support safer work organisation.

Finally, participants emphasised the importance of worker input and bottom-up adaptation. Hybrid AI and adaptive systems could allow workers to explain why they decline tasks, flag unsafe routes, or provide feedback on app prompts and instructions. This would enable algorithmic systems to incorporate workers' situated knowledge rather than relying only on abstract performance metrics. In this way, hybrid AI could contribute to a more worker-centred form of AM, but only if explainability, autonomy, and worker voice are embedded into the design from the outset.

Worker-centered governance and successor systems

The findings further indicate that improving OSH in platform delivery work is not only a technical challenge, but also a governance challenge. Participants discussed tools such as Turkopticon (Turkopticon., 2023; developed by Irani & Silberman., 2013), the Reputation Agent (Toxtli et al., 2020), the Workers' Algorithm Observatory (WAO) (WAO; Princeton University., n.d.), and cooperative or worker-led platform models. Together, these examples show that workers, researchers and advocacy groups are already developing alternative systems to address the limitations of existing platform governance.

Turkopticon was developed in response to the invisibility of workers in Amazon Mechanical Turk and the lack of a requester reputation system on the platform (Irani & Silberman, 2013; Turkopticon, 2023). By allowing workers to review requesters and access information about their reliability, Turkopticon gives workers greater control over the tasks and clients they choose. This example illustrates how successor systems can reduce information asymmetries and support workers when the platform itself does not provide sufficient protection.

The Reputation Agent (Toxtli et al., 2020) provides a related example of how platform review systems can be redesigned to improve fairness. The tool prompts customers or employers to consider whether their evaluations relate to factors within or outside a worker's control (Toxtli et al., 2020). This is particularly relevant for delivery work, where customer ratings may affect workers' access to future work or even contribute to deactivation, despite sometimes reflecting circumstances beyond the worker's control (Rosenblat, 2021). Integrating similar mechanisms into delivery platforms could therefore help protect workers from unfair assessments and support a fairer working environment. See Figure 3 for a visual representation on how the tool works.

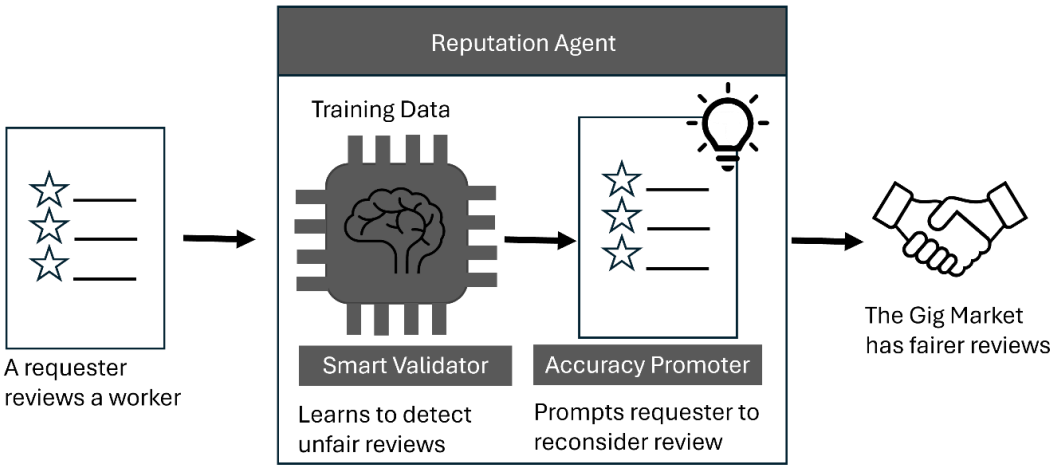


Figure 3 Visual representation of Toxtli et. al., (2020) model of the Reputation Agent functionality.

Participants also referred to broader auditing and worker-support initiatives, such as the WAO (WAO; Princeton University., n.d.), which investigates black-box algorithmic systems in the platform economy through crowdsourced data and collaboration between researchers and workers. Such initiatives reflect the importance of collective knowledge sharing among platform workers. Online communities and worker-oriented platforms can support workers in understanding new systems, anticipating disciplinary procedures, regaining access to platforms, identifying desirable clients or jobs, and sharing strategies for navigating platform work (Wood et al., 2019).

Overall, these examples suggest that platform companies could learn from worker-led and successor systems by incorporating greater transparency, fairer review mechanisms, and stronger worker feedback channels into their own applications. However, this should not simply involve importing tools into existing efficiency-driven systems. Instead, the underlying

governance priorities of platform AM need to shift so that worker safety, voice, and control become central to how the system is designed and evaluated.

Several limitations should be considered when interpreting these findings. First, it is based on three expert interviews, which offer valuable but limited perspectives and do not capture the views of delivery workers, platforms, policymakers, or OSH professionals more broadly. The findings also reflect expert assessments of possible AM-based solutions rather than empirical testing in real delivery work settings, and may not be transferable to other forms of platform work. Future research should examine how delivery workers experience worker-centred AM interventions and test solutions such as safety-oriented gamification, adaptive routing, accident detection, and governance tools in practice. Comparative research across platforms and countries could further clarify how AM can support OSH without increasing surveillance, pressure, or inequality.

CONCLUSION

This chapter examined whether and how AM and related AI-based technologies could be redirected to improve the OSH of platform delivery workers. While AM is often associated with monitoring, control, and efficiency-driven task allocation, the analysis shows that the same digital infrastructures could also be used to support safer forms of work organisation when worker wellbeing is treated as a central design objective.

The literature review identified several technological approaches with potential relevance for platform delivery work, including accident detection, gamification, adaptive automation, ERP-supported workload planning, and hybrid AI. These approaches differ in their specific functions, but they share a common possibility: they can make AM more responsive to safety risks, workload demands, contextual information, and worker needs. The expert interviews supported this interpretation, while also emphasising that such technologies are not automatically beneficial. Their contribution to OSH depends on how they are designed, implemented, and governed.

Across this article, a consistent message emerges: algorithmic solutions should not simply optimise delivery work for speed, productivity, or customer satisfaction, but should actively incorporate workers' knowledge, bodily limits, and safety concerns. Gamification may support safety learning and feedback, hybrid AI and adaptive systems may improve contextual decision-making and workload management, and worker-centred governance tools may improve transparency, fairness, and voice. However, each of these solutions also carries risks if implemented in ways that intensify surveillance, competition, or pressure on workers. For this reason, improving OSH through AM requires more than adding new technical features to existing platform applications; it requires a shift in platform governance so that worker safety and wellbeing become central measures of system performance. The contribution of this paper is therefore not to present AM as inherently beneficial, but to show that its OSH value depends on whether algorithmic systems are redesigned around worker voice, transparency, and shared responsibility for safety.

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Part 4: Safety learning on the job

13 Occupational Safety Learning

Learning Safety on the Job in Food Delivery and Temporary Agency Work

Laura Seppänen, Riikka Ruotsala & Pia Perttula

The ways to organize work and employment relations are rapidly transforming. Platform-mediated work has increased the individualised approach to participating in the labour market and performing work. As a result, individual workers are more connected to digital applications than to organizations (Nilsen et al., 2022), presenting a need to reframe what learning at work entails in fragmented work settings.

Theory: What is occupational safety learning?

Occupational safety learning can be grounded to the wider framework of workplace learning. During the last decades, workplace learning has largely focused on social aspects of learning, i.e. processes of social learning, through which individuals acquire skills and knowledge and adapt to their work roles (Bound et al., 2023; Malloch et al., 2011; Lave, 1996). The rapid pace of digitalization, the rise in atypical employment relationships and the individualized nature of work challenge the foundational principles of workplace learning. What was once a relatively stable organizational learning environment has now transformed into a more dynamic setting. As organizations focus more on their core activities, supply chains, subcontracting and partnerships with labour platforms create constantly changing fragmented work settings. Still, the questions of who learns, what is learned, with whom and why remain (Engeström, 2001). Further, the increased use of new technologies – such as apps – raises the question of where, besides the physical workplace, learning might take place, and what are the efficient tools and resources for safety learning. Addressing these questions is important for developing effective safety learning models that are responsive to contemporary work arrangements.

To examine occupational safety learning, it is essential to distinguish between the concepts of learning, training and instruction. Each of these concepts plays a crucial role and offers perspectives that contribute to the overarching goal of ensuring a safe and healthy work environment. However, a challenge is that the terms are frequently used interchangeably and without precise definitions creating a risk that learning becomes narrowly understood– potentially confined to a safety training session.

We argue that to fully harness the potential of occupational safety learning, the framework should be complemented with explicit conceptions of learning. Better integration of the theoretical learning perspectives into OSH can enhance the meaningfulness and effectiveness of safety learning, ultimately promoting a more comprehensive approach to occupational safety.

In general, studies addressing OSH comprehend learning typically as training and induction. To our knowledge, it is relatively rare that the concept of learning is thoroughly theorized or explicitly defined in terms of what learning encompasses. Education aims at learning. Engeström (1994, p.1), with an activity theoretical view, describes learning as 1) a meaningful construction and creative use of intelligent cognitive tools, both internal mental models and external instruments, 2) participation, collaboration and dialogue in communities of practice, and 3) criticism of existing conditions, innovation and creation of new ideas, tools and forms of practice. All this means that learning may take place, besides education, also incidentally and tacitly at work and other activities, practically without conscious efforts.

Training, according to Engeström (1994, p. 5), is an education that aims at particular skills and competencies. An employment relation includes a lot of training such as job rotation, performance evaluation, and guidance. Instruction, in turn, aims at motivating, directing and facilitating studying. Learning is the activity the learner does, while a teacher or facilitator is doing the instruction activity. Because the aim of instruction is efficient learning, the purpose of instruction is to intertwine learning and instruction together as much as possible (Engeström 1994, p.47). This implies that efficient safety training and instruction needs to pay attention to all factors that affect the learners' possibilities for learning. Learning hardly ever takes place exactly like trainers or instructors expect. When taken seriously, the gap between learning and instruction can be a source of mutual learning for both parties. Also instructors and facilitators may learn (Engeström & Sannino, 2012).

Yrjö Engeström (2001) argues that any theory of learning must answer at least four questions:
1. Who are the actors that are learning, and how are they defined and located?
2. Why are they learning – in other words, what makes them take the learning effort?
3. What do they learn – what are the contents and outcomes of learning?
4. How do they learn – what are the key actions and resources of learning?

A central concept is a learning resource. A resource can be induction, training or any other way of giving information, but also platform's operational practices or workers' previous experiences can be learning resources. From learners' perspective, training, instruction, and also (algorithmic) infrastructures of labour platforms and applications, are potential resources for learning. Learners' own biographies and experiences are also resources for learning. Inspired by Klotzer & Kloetzer (2025), we find that the resources for safety learning can be grouped into three large categories: 1 workers' (learners') personal biographies, 2 the working contexts including its digital tools and infrastructures, 3 organised OSH training, induction and information materials available to workers.

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14 Learning Instances of OSH in Delivery Work in Finland

Food Delivery Workers' Learning Instances of OSH in Everyday Work

Laura Seppänen, Riikka Ruotsala & Pia Perttula

Abstract— This chapter describes instances where food delivery workers (couriers) in Finland face risks in practical work. A framework of four learning questions: who learns? why they learn? what is learned? and how learning takes place? (Engeström, 2001) are used in the analysis of the instances found. In all instances, the learner is an individual food delivery worker. Learning is motivated strongly, but not only, by optimising income from delivery work. Couriers, being independent contractors (freelancers), may learn to better understand the risks or tensions existing in food delivery work, which may lead to criticising, accommodating or quitting delivery work. The couriers could learn to better understand their working conditions, to orient to their work in different ways, or take new actions (such as finishing couriering). We pay particular attention to the resources – concepts, tools or practices - that couriers use in their learning. From the couriers' perspective, the resources take place as problems and possibilities. The instances analysed suggest that couriers learn OSH from risk factors but often do not associate them with OSH. The resources found can be used in designing motivating and efficient practices to enhance OSH learning.

Keywords— About four key words or phrases in alphabetical order, separated by commas.

INTRODUCTION

There are two large international food delivery companies operating in Finland which we call platform A and platform B, which mainly differ in their algorithmic management practices of workers' evaluation (rating), task allocation and worker time management. These platforms are presented in chapter 8 of this volume, especially from the point of what aspects of their algorithmic management might cause unsafe working conditions or behaviour for food delivery workers. This chapter focuses on food delivery workers mainly on platform A. In Finland, practically all food delivery couriers have a freelancer contract and are self-employed (2025).

DATA & METHODS

The data consist of seven qualitative thematic interviews of food delivery workers, the length of which varied between 60 and 91 minutes and were collected from two cities. Five of the courier interviews, from company A, were collected in February 2022 and two interviews were collected in autumn 2021 from company B.

The interviews were done during a previous project that focused on fairness of platform work in Finland[6]. On platform A, interviewees were recruited with the help of platform A giving a list of couriers' anonymous codes in Helsinki area 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 directly the researcher. A similar process was applied with platform company B. In this way, couriers' anonymity towards delivery platforms was preserved.

Delivery workers were asked about their relationship with the platform company, how fair they experienced it and their work, what was the role of platform work in terms of income and life now and in the future, and what were the greatest advantages and disadvantages of platform work. The interviewees told about their daily routines when carrying out delivery tasks. The thematic interviews allowed workers to express concerns and ideas that were not previously thought of by researchers. Main characteristics of the seven interviewed couriers are listed in Table 8.

Table 8 Characteristics of the interviewed learners.

A:Interviewee	B:Time worked as courier/years	C:Dependence on income from delivery platform	D:Vehicle	E: Average work hours (h/week)
Antti, 80% job elsewhere	Four	10-15%	Bicycle	2-3
Petri, student	Two	30-60%	Car	
Gadi, food delivery, private studies	Two	Almost 100%	Bicycle and car	50-70
Jakov, stopped working as courier	Does not work as courier anymore	0%	Previously bicycle and car	0
Ruben, student	Two	100%	Car	25
Marja, student	Three months	About 20%	Car	3-8
Rohan, full-time job at a restaurant	One	50%	Car	25-30

As we can see in Table 8, all delivery workers except one drive cars. This is normal due to Finnish circumstances of cold climate and sparsely spread population, even near cities. Driving cars is safer that driving bicycles or scooters in terms of traffic.

The interviews were not only made for the purpose of occupational safety. Even though this is a shortcoming of the data, the interviewees told about safety related issues voluntarily, which tells about the importance of those issues. More than that, the data shows the practices or resources (or lack of them) existing on these two delivery platforms that indirectly affect conditions that hinder or promote learning of occupational safety.

[6] Fair work on platforms – REITA | Finnish Institute of Occupational Health (ttl.fi)

In the first phase, the interviews (n=7) were carefully read many times. By using ATLAS.ti software, the learning instances where workers talked about OSH issues or about how platform work and its conditions and environment affected their well-being and behaviour were coded. These instances were initially identified as representing some of these themes: 1) Instances with hazards or accidents; 2) Instances in which direct or indirect measures of the platform promote or hinder safety; and 3) Uncertainty and platform work's role in the future of workers. These four themes were operationalised with a more detailed coding of the data.
In the second phase, the learning instances were written down as small narratives. Simultaneously, these instances were qualitatively interpreted with the help of the four questions of learning depicted above (the who, why, what and how). In all of them, the learner (the who) is the interviewed delivery worker (courier), but responses to the why, what and how-questions differ in each instance. In the third phase, the learning resources found were analysed and grouped into problems and possibilities.

FINDINGS

Five instances of learning

Many of the interviewees, particularly the experienced ones, had some message to tell that was important to them (Table 9). Uncertainty of their work in the future, experiences of unfairness, worry about those who are dependent on income from the platform, tension between the platform practices promoting employee and independent contractor - types of behaviour, and the discrepancy between platform work and the Nordic welfare society were among these messages.

Table 9 Motivation, main message and hazards of the interviewees

A: Interviewee	F:Motivation for delivery work	G: Important message in the interview	H: Accidents, hazards or other remarks
Antti, 80% job elsewhere	Bicycling as a hobby	Couriers dependent on platform income should be protected	Enjoys driving fast and taking traffic risks
Petri, student	Money	Uncertainty, because platform A's business model is not profitable	-
Gadi, food delivery, private studies	Freedom and money	Contract as freelancer, but I'm often treated as employee	In case of snowstorm, platform A did not help
Jakov, stopped working as courier	Money	Freelance couriering does not fit into welfare society model	Falling with bicycle, car problems
Ruben, student	Extra money, freedom	-	-
Marja, student	Money	Waiting in restaurants is stressful (6:3)	-
Rohan, full-time job at a restaurant	Freedom, easy money	-	-

Before going into risks and hazards contributing to OSH, we must first understand, why individuals have chosen food delivery work that is known to be risky and unfavourable in many

ways. Table 9 shows interviewees' main motives for delivery work through platforms (column F). Platform workers, including food delivery couriers, are known to be very heterogeneous (Vallas & Schor, 2020; Le Breton & Galière, 2022). Besides gaining income a very common, overarching motive is the freedom and autonomy as experienced by workers. The same applies to our sample. Next, we take a look at couriers' instances where they learn by confronting instances or platform practices that are risky for OSH or well-being. These instances show risks that are related to vehicle, traffic and weather (A, B and C)or to their piece-rate (task-based) income model, prevalent in freelancer and contractor type of food delivery work (D and E).

Learning in risky instances of vehicle and traffic

Here, we describe and interpret three instances where vehicles and traffic were major factors. In describing the instances and interpreting the quotations, the focus is in the four learning questions (Engeström 2001): who learns, why and what is learned, and how they learn.

A. Falling with a bicycle (a vehicle accident)

First we take a look at the accidents or risky situations that are listed in column H, Table 9. A courier we call Jakov describes an accident event like this:

Interviewer 1]: So, why did you stop working for (Platform B) in the first place?
Jakov: (…) I actually fell off a bike. I didn't hurt myself a lot. I mean, I could continue, and my bike needed a little repair, not so much. But then, I was looking like how much am I earning and that, and I decided not to do that anymore. (…)
And then, I realised that, if I actually hurt myself a bit stronger, or if I actually broke the bike or something completely, then, I mean, I don't have any insurance, no sick leave, nothing. So, I decided like, it's not worth... Yeah, that it's maybe simply too unfair that I'm taking too much hazards in a way.

In terms of safety learning, Jakov is learning because he needs income and he experiences a mild accident and understands the very weak or non-existing protection in this type of work. Through the working conditions and the risky work environment, the courier learned to be critical of unfair and unsafe courier work. Quitting courier work, as a concrete action, was an outcome of his learning. He also names cold and rainy weather and small pay as increasing the bad experience. This totality of unfavourable things was also, he states, the motivation for him to participate in this interview and share his experience. It should be acknowledged that Jakov's position to courier work was different than that of other interviewees. Although Jakov was still in the Platform A's list of active couriers, he had stopped couriering and had a satisfactory full-time job elsewhere. While not working in food delivery, he did not have to tell to others and himself positive reasons of doing couriering work.

It is of interest, what are the resources and practices available for Jakov to promote learning of occupational safety. He compared the safety risks in courier work to the protection in salaried work: the experience of falling with a bike, bad weather, no possibility for sick leave and no insurances show the lack of resources (of tools and practices) for occupational safety.

B. Taking traffic risks

Food delivery worker Antti is working in food delivery because it enables him bicycling hobby and simultaneously earn some money, apart from his main occupation (see Table 9).

Interviewer: Did you have hazard/danger situations that affected your health?
Antti: No, I've had luck. And I have also all the time said to myself, that if something happens in this (courier) work, it has always been my own choice. Because I like… Yes I take risks, even unnecessary risks, but I want to, and that is fun that way. It is kind of a subculture this bicycling, city/urban bicycling.
Interviewer: Yes, and you like it?
Antti: I like it, yes. I have fallen a couple of times, but luckily not badly.
Interviewer: Good to hear.
Antti: Yeah. And I have never hurt someone else. So I am…There are much crazier riders than me, let's put it this way.
Interviewer: Yes.
Antti: So I'm quite cautious anyway.

Antti is learning because he loves bicycling. His learning can be described as something risky for occupational safety: to enjoy taking traffic risks while driving. Other parts of the interview show the importance of speed in doing courier work and in gaining work shifts, tasks and income through platform A. It is likely that speed, combined with taking risks, is part of the "subculture" of urban bicycling. Antti is proud of being a skilled and quick rider. There is an individualist attitude: he is aware of the risks and ready to carry responsibility, if necessary. As native Finnish citizen, he knows that in case of street accidents he has public health care. Despite enjoying risk taking, he still sees himself as cautious as compared to other riders.

What, then, are the learning tools or practices (resources) that are used in this instance? The delivery work emphasizing speed encourages taking safety risks. City traffic and the street environment forms a material condition for learning. The urban bicycling hobby may have promoted his risk taking as fun.

C. A snowstorm instance

Gadi: …There was one morning, I remember, there was heavy snow fall, and because of that some other people got stuck in snow. And I didn't have any way to drive. And my shift starting time was getting late. (…) I informed them (the platform dispatcher) immediately that like see, and I took a picture of the scenery. And I'm stuck not for me...because of other people, and I don't have any way to drive out from this situation. (…) And they didn't help me. They said that you have to be on time on your shift. You have to be prepared 24 hours before your shift is starting. That's weird to me. It's kind of robotic answers.
Interviewer: Oh, yes.
Gadi: But in that type of situations I felt like I'm being treated as an employee. And I have been slightly punished because my working performance is very good always, but every 15 days it's being reviewed. So, this like...from last Sunday or next 15 days if I do a single mistake, they will put me down.

Courier Gadi describes this incident where due to heavy snowfall, some other cars block his way to a starting zone. As a rule, platform A obliges couriers to start their work shifts on a certain time and location zone. If a courier fails to be in time or in place, his performance score for internal ranking on the platform goes down, and his chances of getting future work shifts are lowered. Gadi is earning all his living on income from platform A, and therefore the scores and ranking levels are very important for him. Due to weather and other cars stuck in snow, he was unable to reach the starting zone in time. Obviously, it was a stressful situation for him. But more stressful was platform A's response to his message in which he told about the problem. The dispatcher did not show any flexibility, even though the situation was totally out of the courier's control.

Gadi learned many things from this instance. He took the rigidity of the robotic message of the platform as a punishment, because the platform did not count for his previous very good performance. Only the things that happen within last 15 days count. There is no way of accumulating a reputation of being a long-term reliable, good worker. The fact that platform A obliged couriers to start their shifts in a certain location and time did not, according to Gadi, match with the role of a freelancer. He learned that in this instance, he is treated as an employee instead of a freelancer. He learned from the mismatch between his freelancer contract and reality that platform A was treating him unfairly and diminishing his autonomy as a freelancer. The contract, and platform A's rules and communication in this instance were resources used in this learning. The OSH risk involved was not limited to weather and the physical environment, but to psychosocial factors causing stress and an experience of unfairness.

While doing some private studies, Gadi was getting all his income from platform A. He was a non-EU immigrant with minimal skills in Finnish language. As he told: I don't have any personal life here (in Finland). I try to make some money with all my free time. Although he did not directly express it, we can assume that there were not many alternative jobs for him. He enjoyed the freedom offered by delivery work, but simultaneously was frustrated and stressed about the tension between the status of self-employed and being treated as employee by platform A. In the following, we turn to learning instances that were related to payment per tasks (piece-rate) prevalent in Finnish food delivery work.

Learning in task-based (piece-rate) payment model

D. Working long days

Gadi works long days (see Table 9).

Interviewer 1: Do you get tired of working long days?
Gadi: Obviously. (…) Because working more than eight hours is really hectic sometimes, but as I told, platform A didn't force me to work 10 hours a day. It's my choice. I thought okay because I'm not doing as usual nine to five job and being an independent contractor I have so much expenses. If I had an employment...if I had a job then I didn't have to spend those moneys. So, I should make some extra money to cover those extra expenses. That's why I do a little bit more work.

A lot of research in critical sociology shows how platform work turns employer costs, such as insurances and equipment, on the shoulders of workers as independent contractors. Together with a relatively low pay and the uncertainty of getting gigs, platform work may

exploit workers (Ahsan 2019; Gandini 2019; Taylor et al., 2023). In the excerpt above, we see how Gadi has learnt to justify his load of long working days: it is his choice. Having this autonomy is very important for him. Gadi evaluates his work in terms of money. As self-employed, he must pay much more costs such as fuel, car and insurance, and from this perspective, these costs are the reason for him to voluntarily work more. Voluntariness, or autonomy, can be interpreted as a resource to explain and tolerate the negative aspects and economic and health risks of delivery work. The narrative continues:

Interviewer 1: Yes, I understand that. I hope your health and wellbeing is still fine.
Gadi: I also hope that. That's a good point. Thank you.

We see that Gadi does not himself mention risks of OSH and wellbeing – in this case, the interviewer makes him expand on outcomes of long workdays, which he acknowledges. Long workdays are a well-known OSH risk factor (Ropponen et al., 2020). Gadi has voluntarily learned to work long, often up to 10 hours per day, because the contract form obliges him to cover the costs that would be covered by the employer in employment relation. In this way, he adjusts his activity to the platform logics of relatively free schedule autonomy, piece-rate income and a rating system rewarding active workers that work long and do many gigs rather than opposing it or trying to influence it. The necessity to pay vehicle costs, insurances and other costs related to the self-employed status, together with the freedom offered by the platform, is how he has learnt to justify his work with apparent risks. The nature of salaried employment serves as a point of comparison to his situation. Our example here suggests that the platform may use the logic of voluntariness of workers to make them work long hours. It also shows the psychological mechanism of how the logic of voluntariness takes place in practice. Workload is induced by other factors such as low pay, insecurity and the platforms' strong emphasis on earning money by working with haste.

E. Waiting in restaurants

One of the things causing stress to couriers is the waiting time for food orders in restaurants (see also Le Breton & Galière, 2022; Jesnes & Rasmussen, 2024). The restaurant workers have to serve both customers present in the restaurant and orders coming from their platform app. Restaurants have to pay a commission to the platform from each delivery, and therefore they prefer to serve first the more profitable customers coming physically to restaurants. This task/gig-based payment system directs workers to put their effort to maximising their income. As restaurants often are busy, they often cannot fullfil delivery orders in time. Couriers have to wait, often outside in their cars. Couriers on platform A are paid only for the tasks and distances they have done and therefore, the waiting time is time waste without income.
Jakov: I was waiting to pick up one delivery, it was one restaurant, and it had some kind of delay, so I was there waiting for an hour to pick this up, and there was like 10-20 different food couriers. (…) And the thing is that in that one hour of waiting, you know, nobody [of the delivery workers] earns anything. You just wait. Because you're paid by the delivery, so if anything happens, anything, you are the one taking the risk. So, it was completely problem from the restaurant, they were short-staffed, they had some problems, but the worker in the restaurant, they're paid by an hour, they have normal wage. And delivery guys are paid by the amount of deliveries. So, you're taking all the risk.
Jesnes and Rasmussen (2024) describe how those delivery workers with hourly salaries may find the waiting times relaxing and use it to meet colleagues in or near the restaurants.

However, this is not the case in our data where all workers are paid by the number of deliveries. Aiming to work hard and to gain income efficiently, waiting is described as stressful by delivery workers. Jakov tells how the differing payment systems between delivery workers paid by the amount of deliveries and the restaurant workers paid by an hour produce inequality. The encounter of the differing payment systems of the restaurant and the delivery is an outcome of the increased fragmentation of the platform organisation (Nilsen et al., 2022; Oppegaard & Bråten, 2024). And in this fragmented system, the food delivery worker has to carry the risks. Other interviewees tell about the stress caused by waiting as lost income. Basically, couriers learnt from the waiting time instance the both individual and societal injustice embedded in food delivery work. The task-based payment system of food delivery and its comparison to the hourly-based payment of the restaurant workers are the main external resources that shape couriers' learning in this instance.

DISCUSSION

We can now answer the four learning questions and thus condense food delivery workers' learning in the five instances explained above (Table 10). In all of them, the learner is the food delivery worker.

Table 10 The why, what and how -answers in the five instances of learning

	1. Why the worker learns? (motives)	2. What they learn? (outcomes)	3. How they learn? (resources)
A. Falling with a bicycle	Need of income from the platform.	Platform work is not worth it, a worker decides to finish courier work.	Problem: being confronted with the near misses and risks in his own work, and by comparing it to his platform income.
B Taking traffic risks	A courier wants to become a skilled urban bicyclist.	To play with and take urban traffic risks, to have fun.	Possibility: Enjoying food delivery as a "speed sport", supported by a community of urban bicycling hobbyists
C. An incident of snowstorm	Need of and dependence on the platform income.	Rules, rigidity and bad communication from a platform, freelancer contract's mismatch with platform A's practices. "Despite having a freelancer contract, we are treated as employees" Feelings of being helpless and punished.	Possibility: Communication with the platform (Taking a photo, contacting the dispatcher). Problem: Understanding the impasse between platform practices and the snowstorm problem.
D. Working long days	The courier must cover more costs than in conventional employment.	He has learnt to work long days, up to 10 hours.	Possibility: Justifying that working long days is in fact a courier's own voluntary choice.

	1. Why the worker learns? (motives)	2. What they learn? (outcomes)	3. How they learn? (resources)
E. Waiting in restaurants	Waiting in the piece-rate payment system of food delivery does not give any needed income.	Piece-rate payment makes workers carry all risks and produces stress.	Problem: Comparing the waiting of piece-rate paid food delivery workers with the hourly wage payment of restaurant workers.

We see that in practice, many factors (Table 10) are integrated in forming the challenges of learning occupational safety. The five instances of learning have both similarities and differences. One similarity is that income is involved in motivation, the why part of learning (Table 10, column 1), but this comes out in different ways. The instance B, taking traffic risks, is most exceptional among these instances, because the main motivation for learning is hobby, not income. In instance D, the income appears as costs that the self-employed courier must pay, and in instance E, the motive is the waste of time that could otherwise be used to gaining income.

The analysis of A, C and E instances show that the outcome, the “what” of learning (Table 10, column 2) is an increased awareness of the negative sides and risks of platform work. This awareness yields a new orientation, and in case of instance A, it yields finishing courier work. In instances like a C and E, a courier may learn to live in a dilemmatic situation where courier work is understood as unfair and risky, but still its advantages (e.g. income, freedom and flexibility), keep them couriering. Instead of blaming the platform or the self-employment model, a courier may also turn the risky situation into justification of working longer hours (instance D). The learning outcome as taking conscious traffic risks (instance B) is part of the hobby and opposite to occupational safety. In the possibility of the D instance, the outcome of voluntariness is working long days.

The problems and possibilities as resources in the learning instances are answers to the how-question of learning (Table 10, column 3). The resources may be used in or give inspiration to OSH training materials for delivery workers to make safety learning more meaningful. They show how some of the OSH risks in food delivery on platforms materialise and are experienced in the real and practical contexts of couriers’ work. This kind of knowledge is a good basis for developing efficient practices for OSH learning.

In none of the five learning instances the OHS related training, information or organized induction appears as a resource. The findings also tell that OSH support from the platform may be distanced from the practical work of couriers. Also, other couriers are minimally involved in these learning instances.

Problems tell us that despite being negative experiences, couriers could learn to better understand their working conditions, orient to their work in different ways, or take new actions (such as finishing couriering). Therefore, problems can be considered as learning resources. Rather than being positive tools or practices supporting learning in OSH issues, the problems come from the risky factors themselves, or from the everyday life of courier work. They may push couriers towards safety learning.

When we look carefully at these resources, they are not about the risky or possibility elements only – they also include a comparison. In instance A, it is the benefits in employment, in B the urban bicycling hobby. The problem involved in the C learning instance is the mismatch of the platform practices when compared to courier's contract as an independent freelancer. In the last E instance, the comparison point in the problem is the hourly wage of restaurant employees. We see that couriers' experiences or images about employment affect their learning in courier work (Immonen & Seppänen, 2025). .

This chapter and analysis also have limitations. Due to data collection method, the data might not be representative of the Finnish food delivery workers' population. However, findings from other recent studies (Perkiö et al., 2023; Pärnänen, 2023; Tuomi & Passos Assençao, 2023) support our findings.

We have applied an activity theoretical view to learning in which the why, what and how - questions of learning were analysed (Engeström, 2001). Also, a pragmatist conception of "learning by doing" (Dewey, 1974) can be seen. However, couriers' new understanding as a learning outcome was not shared socially with colleagues or with the platform - algorithmic management and self-entrepreneurship both increase individualization (Seppänen et al., 2023). Based on these data, the social aspect of safety learning is minimal. The findings suggest that couriers learn OSH from risk factors but often do not associate with OSH. Moreover, learning from risky experiences does not follow the preventive principle in OSH (Directive 89/391/EEC). Freedom and flexibility are important motivations for delivery workers. This suggests that voluntary practices that fit with couriers' own work and environment would be more successful than obligatory measures in learning safety.

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15 Safety Learning in Delivery Work: The Dutch Case

Safety Learning in Delivery Platform-Organisations: The Dutch Case

Mairi Bowdler

Abstract — The aim of this chapter is to describe safety learning in delivery platform companies based in the Netherlands, and discuss whether there are any solutions for improving safety learning in platform work based on the interview data and previous literature. The analysis suggests that safety learning in platform delivery work is strongly shaped by the degree to which the platform organisation creates opportunities for social interaction, feedback, oversight, and practical support. In particular, the presence of a physical hub appears to support both formal and informal safety learning, while self-employment arrangements limit the organisational responsibility for training and safety management. In this chapter, safety learning refers to the formal and informal processes through which delivery workers become aware of occupational safety and health (OSH) risks, develop strategies to manage these risks, and communicate safety concerns within the organisation.

The data consists of seven interviews from two different platform delivery companies based in The Netherlands. The two delivery companies are both international organisations but appear to have different frameworks in place in terms of their processes with regards to safety learning. In order to differentiate between the companies, from this point onwards, we will further refer to them as ‘delivery company A’ and ‘delivery company B’. Please refer to ***the TNO contribution in Chapter 6*** for the differentiations between the two delivery companies used for data collection. The main difference that we would regard important to mention specifically for this chapter is the status of couriers. Delivery company A's workers are hired by temporary employment agencies and Delivery company B's workers are self-employed. This is said to have a big effect on safety learning practices (Bråten et al., 2024).

See TNO contribution in Chapter 6 for the described methods of data collection for the excerpts of the interviews below.

The Employer

Below we have summarized quotes from the interview with one employer from delivery company A. The summary highlights several situational and organizational resources, as well as challenges, that influence food delivery couriers' learning to observe safety risks and manage OSH issues.

1. Organizational structure and support: The company has a dedicated team of around 120 people responsible for managing couriers on a daily basis. Their responsibilities include performance evaluations and health and safety checks. As stated in the interview,

   "we have a team of around 120 people who is managing the couriers on a day-to-day basis, completing performance checking's but also health and safety checks as part of it."
   Site departments, such as "our life operations," are also involved in directly managing couriers during their shifts to provide immediate support.

2. Feedback and communication: Regular check-ins with couriers serve both to evaluate performance and to solicit feedback. The interviewee explained,

   "once every 13 weeks we do a performance review and then on a weekly basis we do check-ins." They added, "we also ask it the other way around, we ask them 'what do you think we need to improve, do you need any help with anything?'"

   This two-way communication aims to address immediate concerns and enhance safety measures by actively involving couriers in the dialogue.

3. Safety management culture: The company is starting a safety management culture program to ensure safety values permeate all organizational levels. The interviewee noted,

   "it's more than fine to tell the couriers to drive as safe as possible but if the managers don't feel that then it's very difficult to say that to your couriers too."
   The program aims to address this by spreading safety awareness "through all the layers in our organization."

   The biggest challenge is shifting the overall safety culture: *"The most difficult thing is really changing the culture in general so we can put all frameworks in place, you name it, but if couriers don't feel it themselves, it's [culture] the most difficult thing to change."*

4. Onboarding and training: New couriers go through a comprehensive onboarding process that includes health and safety training.

   "Our couriers come in and we always do an onboarding with them," which is part of both the performance cycle and safety training."

   The training covers potential street hazards, like *"how to cross a tram rail,"* and provides access to a *"customer learning experience platform"* with various safety modules.

   "There are videos in which they show different traffic situations, and a courier needs to think of what is going to happen next."

   This training is designed to prepare couriers for real-world scenarios, although it is acknowledged that *"it's all theory and really in the end they need to see it in practice."*

5. Challenges in implementation: Despite these structured frameworks and safety programs, changing the overall safety culture is challenging.
   "What you want to avoid is that someone gets into an accident and then start to realise. You want to have that already up front."

Financial constraints are noted as a potential limitation, *"it's sometimes made a bit difficult as it's quite an expensive model that we have,"* but the organization is committed to *"continuing on this path."*

It was noted that governmental support would further boost the successful implementation of safety learning:
"I do think if the government is supporting us on this as well, it would really help with enforcement on both ends lets say."

Overall, these measures illustrate this company's approach that combines organizational support, feedback mechanisms, structured training, and efforts to build a proactive safety culture. This approach aims to enhance the awareness and proactive behaviour of food delivery couriers in managing their safety risks.

The Delivery Workers

Below is a summary of the data from 6 delivery couriers from both delivery companies A and B. The quotes highlight various situational, organizational, and institutional factors impacting food delivery couriers' ability to learn about safety risks and take action on OSH issues.

Delivery Company A:

1. Training and onboarding: New couriers receive basic safety training when they start, which includes instructions on helmet use, traffic laws, and using hand signals. This training is conducted both through a brief initial session and a more detailed follow-up session from a 'delivery captain' in the locations hub. The training emphasizes the importance of personal responsibility and adherence to traffic rules to ensure safety. *"We tell them the rules about the gear, the rules about the hub… and then we show them a bit about the app, not too much, half an hour, just the basics, important stuff…every new driver in his second shift, they have a one-hour presentation... and in this presentation, they find all the details that we don't tell them about the job."* Another courier from this company mentioned that actually this training included too much text, and recommended there should be less to improve safety learning for new couriers *"A lot of people do find it a lot of text and I personally don't find it very useful."*

2. Organisational structure and support: There appears to be a safety culture fostered through regular interactions at the hub, where couriers can ask questions and receive feedback. Couriers value these interactions and peer learning, observing and emulating safe practices from colleagues. *"I was looking to my colleagues, how they do it, how they work, to take the experiences from everyone to have an idea to be more safe and to deal with problems."* The presence of a hub seems to reinforce safety compliance, suggesting that physical company spaces can positively influence safety behaviour. *"My feeling is that the cities that don't have the hub, they use the equipment less… if they have the hub, they feel the control of the company."* Another courier expressed the need for more conversations in order to determine practical safety measures *"If you really want it to be safe, I think it's better to just have a conversation a couple of times a year about what are the things that need the most improvement."* Another courier mentioned that the company attitudes towards safety impacts the safety outcomes, *"The reason it is so safe is simply because things are taken seriously."*

3. Pay structure: The couriers in this company are paid by the hour. They reported feeling less pressured to take risks compared to those paid per delivery. The hourly pay model reduces the incentive to rush, which is seen as a key factor in maintaining safety. *“I prefer to be, with us we’re being paid per hour, I think that getting paid per order we would take more risks as you would want to make more money so you would be driving faster.”* Couriers suggest that per-order payment could lead to more reckless driving in pursuit of higher earnings. This suggests that financial incentives are not only employment conditions, but also safety-learning conditions, because they influence whether workers have time and motivation to apply safe practices.

4. Personal protective equipment (PPE): While helmet use is mandatory for this company, there is variability in compliance depending on the presence of a hub. *“sometimes people don’t want to wear the helmets, but it's very little.”* Cities without hubs exhibit lower helmet use, indicating that local organizational support structures might influence PPE compliance.

Delivery Company B:

1. Safety measures and oversight: Basic safety checks are required, such as checking bike brakes, tire conditions, and having a phone holder. However, these checks are minimally enforced, with many couriers ignoring them, especially regarding bike maintenance. *“Most people here don’t even have working brakes anymore; they’re broken. The brakes on electric bikes wear out. It’s not really well-checked.”* This indicates a deficiency in strong institutional oversight. However, since the delivery personnel at Company B are self-employed, the company is not required to provide such oversight. In terms of training, one courier mentioned how they watched a YouTube video independently to learn about various traffic rules and recommended that the delivery company should have this implemented, *"For the beginners, I think they should provide a small video that has all the stuff about the app and all about what you need to know generally, you know, so you get a little bit familiar what you can expect from the job,"*. This approach could help new delivery workers feel more confident and aware of the necessary safety protocols from the start.

2. Organisational psychological and peer support: Couriers express a desire for psychological support, emphasizing the value of knowing that help is available if needed. *“Psychological thing, knowing that someone is behind you is just nice. As a delivery person, you are reasonably involved, so you have other delivery people you can ask for help.” “[…]but it gives you a nice feeling that if something happens, you're not alone. You miss that with [company name].”*

3. Feedback and communication: A courier expressed that the company is experimenting with rider forums and city representatives, allowing couriers to discuss safety issues directly with management. *“[Other delivery company] had a rider forum, where riders can choose a representative from each city. 4x a year consultation at the [other delivery company] office…Where safety issues could be discussed, person to person.”* Here, the courier is explaining that platforms that an alternative delivery platform were using are perceived positively as they facilitate direct communication and address safety concerns.

4. Technology: Implementation of features like restricting new orders while moving is noted to improve safety learning. *“Normally you get a new order while driving, you had your own*

active situation (traffic) notification…at [other delivery company] implemented that we could only get a new order when we were at the customer." Couriers recognize that reckless driving offers minimal time savings and believe that clearer communication from the company could encourage safer driving practices. *"In the end, it doesn't really matter whether you drive through a red light or just wait nicely… The difference is 1 or 2 minutes at most."*

5. Equipment and maintenance: There is a suggestion for the company to provide its own bikes, similar to other companies, with regular maintenance and GPS tracking for better safety management. *"If [company name] is smart, they would start their own bike rental service… Safety-wise, that would be much better for bikes."* This indicates a perceived gap in the company's provision and maintenance of safe equipment.

The interviews above were able to provide some valuable insights into existing safety learning techniques by two different delivery platform companies based in the Netherlands. The interview data reveals that while some safety training and support exist, there is a need for more consistent and enforced safety measures in order to improve overall safety learning. Situational factors like employment status, pay structure and peer influence significantly impact couriers' safety behaviours. Organizational resources such as physical hubs, peer networks, and clear communication channels are seen as valuable, yet there are gaps in consistent enforcement and equipment maintenance. Enhanced oversight, better infrastructure, and psychological support could improve learning about safety risks and acting on OSH issues.

One main difference between the two delivery companies assessed in the Netherlands, was that one company has implemented a 'hub' environment for their delivery workers. A food delivery company 'hub' is a designated area or facility where delivery workers can gather, rest, and access various resources for their work. With regards to safety learning, it appeared that 'hub' was able to provide numerous possible positive opportunities.

A delivery worker from *Delivery Company A* mentioned that there are noticeable differences in delivery worker safety without the 'hub', stating that safety compliance is reduced. Additionally, an interview with a delivery worker from *Delivery Company B*, which lacks a hub space or in fact any support system set up by the organisation, revealed that they would prefer more social support as a means to ask for help and advice. Given the potential safety learning benefits from organizational arrangements that provide social support to delivery workers, we recommend implementing such 'hub' spaces. However, the approach of a 'hub' also has its limitations, primarily due to the associated costs. The employer interviewed highlighted that their model including the 'hub' design is expensive and suggested that governmental support would be crucial for its sustainability. If government bodies acknowledged the significance of these spaces for safety learning in a sector known for high OSH risks, such spaces may contribute to stronger safety learning and could potentially reduce OSH risks over time. Despite these limitations, the interviews suggested that the hub seemed to offer an opportunity to facilitate and positively influence safety learning in various ways:

- allowing for social support through shared experiences and safety tips, creating a sense of community to encourage safety standards
- access to managerial colleagues where feedback and safety guidance can be accessed
- serving as a venue for safety training sessions and checks

Another key theme that was reoccurring throughout the interviews with the employer and delivery workers was the importance of organisational social support and feedback

communication that is available for the drivers. This is something that can also be facilitated by the hub. Previous research has stressed the importance of social support, as well as high autonomy, as factors that may modify the impact of psychological demand both in and outside of work (Johnson and Hall., 1988). Given the typically low levels of peer and social support in platform work, combined with the high degree of control exerted by platform algorithms (Bråten et al., 2024), platform workers are particularly vulnerable to occupational stress due to heavy workloads (Berástegui, 2021: 37–38). In terms of safety learning, social support could be beneficial in the workplace, especially for safety performance (Sampson, et al., 2014), and safety compliance (Clarke., 2013; Yagil and Luria., 2010; Nguyen-Phuoc et al., 2022). If this is the case, for a delivery worker where OSH risks are particularly high, the implementation of more peer-to-peer, managerial or general support could be a simple, yet a beneficial change for delivery workers OSH.

Safety culture was another theme that appeared throughout the interview data. Research has shown that safety culture aids the fostering of certain safety learning abilities and overall safety performances, and that this relationship works both ways (Littlejohn et al., 2014). This relationship has been found to be present in certain sectors, such as in the mining industry (Zhang et al., 2020); the construction industry (Jebb., 2015), and healthcare (ACHE., 2017). The employer from our interviews mentioned that the biggest challenge is shifting the overall safety culture of the company, and a delivery worker mentioned that a strong safety culture is essential for effective safety practices. This suggests that platform company employers and the delivery workers can be aware of the importance of safety culture in terms of safety learning and safety in general, something that has been reported throughout literature (Kalteh et al., 2021).

In conclusion, the findings suggest that safety learning in delivery platform work is shaped by more than the provision of formal training. Rather, it depends on the organisational conditions that enable workers to recognise risks, share experiences, access support, receive feedback, and apply safety practices in their daily work. The comparison between the two delivery companies indicates that physical hubs can play an important role in this process. Hubs may function not only as practical spaces for equipment checks, onboarding, and managerial contact, but also as social spaces where couriers can exchange safety knowledge, observe safer practices, and feel supported by peers and supervisors. In this sense, the hub can be understood as a form of organisational infrastructure that supports both formal and informal safety learning.

At the same time, the interviews show that safety learning is also shaped by broader employment and organisational arrangements. Pay structures, equipment provision, maintenance responsibilities, communication channels, and the employment status of couriers all influence whether workers have the time, resources, and support needed to act safely. In particular, self-employment arrangements may limit the extent to which platform companies are required or expected to provide safety training, oversight, and practical support. This creates a potential gap between the risks couriers face in their work and the organisational responsibility taken for managing those risks.

Overall, this chapter suggests that improving safety learning in platform delivery work requires a combined approach. Formal onboarding and digital training are useful, but they are unlikely to be sufficient on their own. Safety learning is strengthened when platforms create regular opportunities for dialogue, peer learning, feedback, equipment support, and visible managerial commitment to safety. Supportive organisational structures, such as hubs or equivalent

mechanisms, may therefore contribute to a stronger safety culture and better OSH outcomes among delivery workers. Given the small number of interviews and the focus on two companies in the Netherlands, these findings should be interpreted as exploratory rather than representative of the platform delivery sector as a whole. Nevertheless, they point to the importance of treating safety learning as an organisational responsibility, rather than as an individual task left primarily to couriers themselves.

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16 Health, Safety and Well-Being for Food Delivery Workers in Norway

Health, Safety and Well-Being for Food Delivery Workers in Norway: Learning Opportunities and Constraints

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INTRODUCTION TO CASE STUDY

In Norway, two food delivery platforms (P1 and P2) were examined, highlighting their similarities and differences. Platform P1 engages a diverse workforce, including fulltime employees, freelancers employed through a third party and independent contractors. Platform P2 engages contractors and freelancers. P1 positions itself as a delivery service company while P2 distinguishes itself as a technology company connecting their courier partners with clients.

Both platforms implement algorithmic online processes for recruitment through a simple qualification process, training material, worker information and work assignments for both platforms. P1 offers its freelance workers the flexibility to reject algorithmically assigned deliveries, while P2 workers do not have this option. For P1 and P2, the workplace is a delivery zone that is changing and growing as the customer base expands.

Expenses, compensation and benefits:

- For both P1 and P2 platforms, all courier workers shall provide their own transport (bike, moped, or car), pay their vehicle insurance, smartphone, and mobile subscription.
- For P1 employees, compensation is based on collective agreement, the payment includes extra compensations such as extra pay for seniority, bike maintenance, long-distance delivery, additional pay per order. Non-employee payments include additional rate for long distance delivery. Employees have the company jacket, food-delivery bag, and helmet for free, while other workers must pay a deposit. Incentives are offered to non-employees to encourage the use of company branded gear.
- P2 workers are indirectly obliged to wear branded items as requested by clients. All workers cover related costs for transportation, clothing and protective gear.

Work hours and performance:

- For both P1 and P2 platforms, the worktime is flexible. Based on P1's Performance-based scheduling (PBS), best-performance workers are prioritised while poor-performance workers access the schedules last. PBS penalises poor performance through keeping track of "no shows" and rejection by workers.
- P1 employees receive contract hours according to individual availability, weekly schedules are available every week and all workers can grab shifts.
- P2 workers can log on anytime during service hours and grab shifts. A minimum guaranteed pay is offered for zero orders. Performance evaluation includes client satisfaction rates.
- Additional benefits, P1 employees have access to workshops, language cafes and sponsored social events for team performance.

Worker demographics:

- Both platforms primarily employ male workers under 35 from diverse ethnic and educational backgrounds. Their motivation for working as a food courier vary, some choosing it voluntarily other due of lack of alternatives, particularly immigrants.

This chapter is based on and summarises lessons learnt from the PhD thesis "Health, Safety, and Working Conditions in Platform-Mediated Work: A Multilevel Perspective", by Nilsen (2023). It focuses learning and, builds on the PhD article (Nilsen et al., 2021), discussing how influential perspectives in safety science addresses PMW fragmentation of organisations. Furthermore, this chapter includes an additional resilience engineering perspective and the concept of learning within that perspective.

Theoretical framework

The work combines organisational fragmentation and influential organisational perspectives in safety science, which are explored in relation to platform-mediated work (PMW).

There are various definitions of learning, many of which emphasize lasting changes in behavior within an organization (Weick & Sutcliffe, 2007; Schiefloe, 2003). In an organizational context, learning can be seen as the development of new, shared competencies that are reflected in how people collaborate (e.g., Argyris & Schön, 1996). Two key conditions for learning in this setting are: 1. Access to reliable information that can serve as a foundation for improvement, and 2. The application of this information to modify existing actions and work practices (Kongsvik, 2010).

We have chosen to explore the explanatory power of three important theoretical perspectives in safety research when faced with PMW: 1) sociotechnical systems thinking (STS), 2) safety culture and 3) learning potential from the resilience engineering perspective. These research strands were selected due to their recognised application in safety science and their emphasis on work context, which is crucial when examining PMW. STS has significantly influenced safety research by highlighting the importance of the organisational environment together with technology development, regulations, and laws (Carayon et al., 2015; Pasmore et al., 2019; Winby & Mohr-man, 2018). This involves a multi-level perspective on system safety (Rasmussen, 1997) to emphasise the social and organisational factors in complex system design processes (Leveson, 2004). Safety culture has impacted different industries and sectors (Le Coze, 2019). In this work, we consider safety culture as 'the shared safety-related values, norms and perceptions of reality that develop in an organisation when its members interact

with each other and the surroundings' (Kongsvik et al., 2018, Bang, 2011). Given the relation between safety culture and organisation, we explore what happens to learning processes when PMW organisations are characterised by extreme fragmentation. In addition, advances within resilience engineering (RE) within the last 20 years, as a field of research and practice, has led to the understanding that resilient performance is related to work, navigating complexity and sustaining essential functionality during changing conditions (2022, Nemeth and Hollnagel). RE learning is an essential process of understanding the socio-technical system adapting according to these insights, sharing and enhancing knowledge based on actual work experience (Degerman, 2024).

We will investigate organisational learning and RE learning occurring on everyday work, after adverse events such as accidents and near misses, and in formal and informal activities connected to organisational processes in the context of PMW. In addition, there is a need to consider trends having an impact on traditional organisational work:

Fragmenting organisations: Organisations are complex systems characterised by both formal structures and informal social arenas. While formal structures, like organisational charts, define roles and responsibilities, organisations for coordination and control, social arenas exist where workers interact with organisational cultures, engage in power struggles and facilitate emergence of communities of practice as sub-groups of works with common interest and similar work situations (Lave & Wenger).

Safety research has traditionally focused on organisational conditions related to accidents or strengthening safety. These approaches often involve interventions related to safety culture, compliance, protective measures and operational working. However, the increase of subcontracting, outsourcing and platform-mediated work challenge traditional organisational structures and safety approaches with respect to addressing manager-worker dilemmas and management of trade-offs (efficiency and thoroughness trade-offs, Hollnagel, 2009), as well as bounded effectiveness with a wider distribution of authority (Haffman and Woods, 2011). Platform-mediated work presents unique challenges for safety as organisation occurs primarily through a technological platform that coordinates and controls work. The social aspects of the organisation, such as interactions with colleagues and managers, are largely absent. This means that traditional organisational safety focusing on command and control, and compliance tools may not be as effective in this new environment.

Understanding the difference between the formal, social aspects and everyday work of an organisation is crucial for understanding learning processes within PMW. While the formal functions of the organisation are embedded in the platform's algorithms, the social aspects are largely missing. This has implications for safety management and the development of new approaches to ensure worker safety in this context.

Platform-mediated work (PMW): Digital platforms have disrupted businesses and have had a huge impact on how work is organised. Food delivery companies are a good example of the digital age where businesses build on code (Goodwin, 2015). These platforms leverage technology to disrupt traditional business models, lower barriers to entry, and exploit regulatory grey areas (Kenney and Zysman, 2016). PMW can have negative consequences for workers in terms of their lean structure and extensive outsourcing, including training. Workers often face isolation, job insecurity, and income unpredictability. Workers might be exposed to higher risk of accidents due to factors like time pressure and pressure to work long hours. PMW often exclude workers from employee rights and social protections, and platforms can exercise

significant control over workers through algorithms and contracts. This externalisation of risks raises questions about how safety is prioritised and valued in this new context.

Sociotechnical systems thinking and resilience engineering: These perspectives provide an understanding of complex organisational processes involving human-technology interactions and interdependencies that influence everyday work. STS emphasises the tangled network of organisations, with higher-level decisions creating constraints at lower levels (Rasmussen, 1997). The nature of independent contractors within PMW create a complex structure, with no traditional organisational environments. In this context, diverse stakeholder interest, technology changes, and temporary organisational memberships (Carayon et al, 2015; Pasmore et al, 2019) can impact safety management strategies. Rasmussen's migration model offers insights into the tensions between safety, economy, workload and tension among organisational goals. It highlights how individuals and organisations implement local adaptations to navigate these tensions to achieve safety while balancing other objectives. From a Resilience Engineering perspective, this balancing act relates to contextual conditions creating efficiency-thoroughness trade-offs (Hollnagel, 2009). While in organisational learning, what is important is to be able to incorporate learning into the organisational memory, thereby supporting contextual conditions that enable organisational and individual learning. Decisions at the higher levels would constrain this balancing act, and while there is some learning that potentially occurs through these communities of practice, there may be few and far between. Also, the organisational memory in terms of higher order learning may not be possible unless the higher echelons integrate the learning into the system - that is how work processes are designed into the platform and how the entire platform as an overarching organisation incorporates this into the PMW culture or what is expected of workers through their contracts and through shared understanding. The introduction of safety measures such as regulations, procedures and training provide a buffer for workers.

PMW introduces new challenges for safety management. The fragmented nature of PMW, combined with the independent contractor status, can create conflicts between individual and organisational goals. The absence of organisational safety systems may leave workers more vulnerable to risks as independent contractors are responsible for providing their own equipment, training, maintenance and other responsibilities. To understand safety in PMW, we need to expand our understanding of sociotechnical systems to include independent workers and other stakeholders outside the organisation as part of PMW ecosystem. This will help us identify new challenges and develop appropriate safety strategies.

Work as imagined vs work as done: The increased interest in safety culture across organisations can be attributed to the assumption that when safety is valued and prioritiszed on a collective level, this is reflected in positive safety performance and outcomes (Dahl & Kongsvik, 2018; Neal et al., 2000). There is an important difference between a functionalist and interpretative view on culture (Glendon and Stanton, 2000). The functionalist view understands culture as something that can be managed or manipulated. The interpretative view understands culture as an emergent, complex, bottom-up phenomenon. The functionalist view often builds on a traditional understanding of an organisation with questionnaires to measure safety culture in terms of employees, managers and leaders. The traditional organisation no longer exists in the PMW context where workers are not employed but have a role of sole proprietors generally performing tasks distributed, coordinated, and controlled by the digital technology in isolation (Nilsen et al, 2020). The diverse theories and concepts offer a broader perspective on the differences between work as imagined and work as actually done (WAI, WAD), while the functional view may be limited, the interpretive view may provide clues to how

learning takes place - through the short social interactions they have be it digital or fleeting face-to-face encounters - in a sense, as ”communities of practice” (Wegner, 1998. The gap between "work as imagined" (WAI) and "work as actually done" (WAD), is crucial for understanding safety performance. WAI represents how work is believed to be done by those who design and manage systems, encompassing procedures and regulations. In contrast, WAD refers to dynamic and adaptive reality of how work is actually out by individuals facing real-world complexities, resource constraints, trade-offs and unforeseen events. This gap calls for moving beyond simplistic rule-following models and to appreciate the constant adjustments and "workarounds" necessary for achieving desired outcomes (WAI and WAD are frequently referred within resilience engineering literature, although its origins can be traced back to Ombredane and Faverge (1955) in the French Ergonomics tradition). We propose that individualisation reduces interaction between workers and knowledge sharing.

METHOD AND DATA ANALYSIS

Design

The study implemented an explorative research design, collecting data through semi-structured interviews with couriers from two Nordic food delivery platforms (Nilsen, 2023). Conducted between February and September 2020 and some interviews were implemented online via Zoom or Teams. The individual interviews were enhanced with observations of two worker-only online communities, providing valuable insights into informal interactions.

Data collection

In total, 37 semi-structured interviews and observations from two online communities were performed. Various approaches were applied for contacting potential interviewees, including contact via platform websites, social media, face-to-face inquiry near restaurant clusters etc. While P1 managers agreed to be interviewed on several occasions through a videoconference, P2 data from the managers were limited to text format received through email.

Ethical guidelines of the Norwegian Center for Research Data (NSD) were applied. Interviews were audio-recorded if the informant consented, and transcribed. The interview guide covered the following topics (1) individual background (e.g., when they started with PMW, other income-generating activities, education, immigrant/non-immigrant background, union membership, contract type, motivation for joining the platform), (2) platform company (e.g., recruitment, organisation, and company characteristics), (3) courier work experience (e.g., work process, incentives, technology), (4) working conditions (e.g., safety, responsibilities, communication, social support) and (5) regulations (e.g., rights and social protection).

The data collection was not directly focused on learning but on exploring how the workers were organised, how safety was ensured, and the presence of incentives and sanctions. Culture is a framework condition for learning, and safety culture was specifically addressed, including how the platforms communicated with workers, face-to-face and digital opportunities for interaction between workers, and collective problem-solving. The interviews lasted from 45 to 75 min. Participation to interviews was encouraged with a gift card.

Netnography, an online ethnographic method, (Horst & Miller, 2012; Kozinets, 2010), was applied to study couriers’ social interaction and online behaviour. Data collection for the observations occurred following community discourse and consent, in accordance to research

ethics regulations and practices. The online observations occurred from June to August 2020. Observation data included 'thick' descriptions of member interactions through their online communities.

Data analysis

In examining how work is organized and performed in PMW, the data analysis made use of NVivo, a computer-assisted qualitative data analysis software.

The data coding process consisted of two phases which created a strong link between the empirical data and interpretation. In the first phase 1,945 codes resulted from in vivo coding. The codes were systematically consolidated into 52 categories. These categories described observed patterns consisting of general themes and emerging ideas (Saldaña, 2016) emerged from sorting the in vivo codes. Themes included challenges related to working through the digital platform, distinct features of PMW such as performance-based scheduling, and worker experiences of PMW and the online community.

In phase two of the analysis, the codes were further categorised based on thematic similarities. This process distilled the data into nine concepts: standardised services, performance pressures, ratings and ranking systems, scheduled shifts and changing conditions, individual investments, risk factors of delivery work, constricted communication, creating communities, and workers without a workplace. These concepts were then grouped into three main themes: *relegated responsibility, algorithmic authority, and solitary service*.

These three main themes help explain how PMW influences financial opportunities, workload, and safety. The theme relegated responsibility explored how the transfer of risks traditionally managed by organizations have been relegated to individual workers. In *algorithmic authority*, performance pressures and how the platform standardized and, in some cases, modified work processes impacted workers were investigated. *Solitary service* examined how workers, despite the absence of a workplace and the constricted communications fostered by PMW, were able to create digital communities to create a support system as well as provide a way to share information and learning.

To enhance validity, methodological triangulation was employed by comparing the results from the data analysis with observations, interviews, available documents, and online observations, employing (Yin, 2010).

The use of technology and potential hazards and constraints faced by the workers received special focus in reanalysing the data for this chapter. Moreover, we explored the social aspects of PMW, the workers' perceptions of management communications, the platform's safety measures, the pressure to deliver quickly, and how the online community addresses technical issues and other concerns (see table below for summary of findings with respect to HSE learning).

RESULTS AND DISCUSSION

The following aspects were identified in relation to interaction with the platform and learning opportunities:

Formal training
For couriers, there is an introduction meeting, primarily focusing on app functions. Career development is restricted to a few team leaders who are given extra hours to evaluate team performance and motivate fellow employees (around ten).

Constricted communication, interaction with fellow riders and learning
The couriers are on a general basis performing their work alone, with no or few meeting places. This hinders the formation of social relationships and the development of a collective organisational or safety culture, as interaction is a basic requirement for such a development. The structuring of work is also a barrier for collective learning.

Still, there are informal digital arenas for interaction, involving WhatsApp groups, Slack etc., where discussions take place and tips and tricks are shared, i.e. these are also arenas for learning and possibly, cultural development.

Constricted communication: During a shift, the couriers communicate with a dispatcher through a live chat. Face-to-face encounters with fellow couriers are highly sporadic. For the hybrid model, shop stewards and employee safety representatives communicate information from their meetings through Slack (informal way of communication among employees) and occasionally, through email.

Poor management communication was highlighted by many couriers. This was by some referred to as ‘Mushroom management – keep them in the dark and feed them bullshit.’ This lack of information was apparent upon learning that PBS was already implemented, giving access to the schedules according to performance groups. The best performers get to see the schedules first, hence choose the most lucrative time slots while the poor performers get the “leftovers”. This ignited an online feud between shop stewards and dissatisfied employees who believed that the company intended to pressure employees to choose freelancing due to its advantages.

Creating communities: Slack communities gave the couriers the opportunity to learn about company insights and differences, e.g. related to incentives and personal protective equipment support. A separate WhatsApp group provide space for expressing frustrations, exchange information, and seeking assistance (e.g., to borrowing bikes). Both communication platforms were crucial for swapping shifts especially when the App swapping function failed. They facilitated documenting issues through screenshots such as the paid break becoming an unpaid break, and issues with the App. Additionally, Slack offered channels for social events and informal accident reporting to safety representatives.

Concerning work conditions, members shared important information about areas requiring extra precautions due to theft risks. Additionally, they utilised Slack to coordinate bulk orders and issues for shop stewards to present at future management meetings.

Even with a social platform, several factors hinder collective action among the P2 workers: their unfamiliarity with Nordic labour practices and job insecurity. Their social connections formed due that they were immigrants from the same countries.

With the increasing reliance on subcontracting and outsourcing, changing organisations from co-located in-house organisation to more network-based organisation (fragmented) with no

centralised responsibility of learning, safety research has addressed concerns regarding coordination challenges and principal-agent dilemmas (see Eisenhardt, 1989; Almklov et al., 2014) as well as goal alignment and efficiency/thoroughness safety trade-offs (see e.g., Hollnagel, 2009; Almklov & Antonsen 2010; Kongsvik et al., 2012).

Platform-mediated work represents a further evolution in outsourcing, where technology enables individuals to contribute directly to a company's core operations. In this model, the traditional organisational structure and social environment surrounding the worker are absent. While workers remain functionally tied to the organisation, their connection is maintained solely through the app's systems of coordination and control. Distinguishing between a functional/structural understanding of an organisation as a formal system and a sociological notion of the organisation can contribute to understanding PMW and its consequences. Whereas the formal functions of the organisation, the coordination, and payment of work are inscribed in the algorithms, the organisation as a social institution and an arena for social interaction with colleagues and managers is more or less absent. This also means that the organisational 'toolbox' for achieving safety through organisational efforts is different where informal arenas play an essential role for learning. While the informal and social divide emerge as an unattended consequence of new PMW way of working.

Table 11 summarises findings related to constraints, and opportunities for occupational safety, health, and well-being learning in PMW, as well as the theoretical basis enabling these findings. Note that all findings do not relate to a single category for example work organisation is related to both the solitary service as well as fragmented organisations.

Table 11 Opportunities and constraints for OSHW through safety and learning theory lenses

PMW features	Constraints for OSHW learning	Opportunities for OSHW learning	Theoretical basis
Work organisation – solitary service and fragmented organisations	Isolated work – difficulties to share knowledge	Establish own arenas (WhatsApp, Slack) to share work experiences among workers	Developing communities of practice digitally – work as done, not just work s imagined
Training – algorithmic authority	Centralised training and information	Digital training material available for workers	Including the safety into the organisational memory
Platform features – algorithmic authority	Platform with limited training features	Rapid information as push messages providing real time information (e.g. snow conditions, slippery roads)	Rasmussen/STS thinking – dynamic margins adaptations.

PMW features	Constraints for OSHW learning	Opportunities for OSHW learning	Theoretical basis
Incentives – algorithmic authority	No explicit incentives for safety training	Appropriate incentives built into the system?	Acts as a buffer / increases the margin of safety in Rasmussens/STS thinking, helps with balancing efficiency-thoroughness trade-offs - incentive to push towards when one should be efficient and a nudge also in terms of when one should be thorough in the work process.
Responsibilities- relegated responsibility and fragmented organisations	Many are their own boss some are also employees. The employer has no responsibilities for HSE training responsible for HSE training.	The regulators use existing channels to communicate to make workers aware of rights, what they risk in terms of being an independent contractor, etc.	Responsibilities- relegated responsibility and fragmented organisations
Evaluation – algorithmic authority	Performance based scheduling (PBS) system has an impact on time pressure	Monitoring system has the potential to monitor HSE issues.	Possibilities for monitoring the gap between WAI and WAD regarding OSHW impact on workers

CONCLUSION

The finding from the theoretical framework and interviews offer practical and theoretical implications OSHW training. The data reveals three key themes: relegated responsibility, algorithmic authority and solitary service.

The theme *relegated and fragmented responsibility* highlight how platform mandate workers to take on roles and duties typically reserved for employees. This extends to workers accepting individual responsibility for safety and training, independent of their employment contract.

The *algorithmic authority* implemented by platforms presents both advantages and disadvantages. On the one hand, platforms can centralise features like safety training and information, identify hazardous areas. The performance monitoring system also allows for worker follow-up if there is little movement to verify that the worker has not been involved in an accident. On the other hand, features like the countdown timer can induce pressure, especially on new workers, to prioritise speed over safety.

An app-centred platform can isolate workers by limiting communication and learning across workers. Solitary service, or the isolating feature of PMW has a negative impact on social relations and a shared understanding of work.

To compensate limitations, workers have utilised informal social channels like “WhatsApp” and “Slack” to foster solidarity through the creation of virtual communities which enable exchange of information, learning and support for fellow workers.

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17 OSH Training in Digital Platform Work in Spain

OSH Training in Digital Platform Work

José-Javier Larrañeta

Approach and Objectives of the Report

This report complements previous work carried out within the SAF€RA project on Occupational Safety and Health (OSH) in Digital Labour Platforms, specifically in home delivery activities. In particular, it builds upon the report *"Occupational Risks of Delivery Workers in Digital Platforms and Possible Solutions to Safeguard their Safety"* (WP2), which is referenced throughout the text to avoid duplication and unnecessary length.

The report focuses on **training** as a fundamental action for improving the safety and health conditions of delivery workers ("riders").

The objective of this study is to analyse the current situation of OSH training for these workers in Spain, considering the general guidelines of the Spanish labour legislation on occupational risk management and the information and training actions aimed at mitigating the effects of such risks. Based on the risks identified for delivery activities (addressed in Part 2, WP2 of the SAF€RA project), we concentrate on the most significant risks and those for which training and information actions are most necessary. A **gender perspective** is applied throughout the study.

We outline a series of criteria for designing OSH Training Plans, as well as pedagogical considerations for adapting training actions to this group of workers—both in terms of training content and objectives, and in the modalities used to deliver such training. Special attention is given to **road safety risks**, as they represent the highest accident rate among delivery workers.

We also analysed **psychosocial risks**, which show increasing prevalence among workers in Digital Labour Platforms, particularly riders. The main origin of these psychosocial issues lies in the precarious employment situation of these workers, often classified as self-employed and lacking OSH support. This is a global phenomenon that the European Union has sought to address through a specific Directive adopted in 2024 (as indicated in Part 1 of this SAF€RA project), aimed at facilitating their employment regularisation and improving working conditions.

This problem also persists in Spain, despite the Government having published a specific law for delivery workers in 2021, which later served as the basis for the EU Directive. After a rapid analysis of the main digital delivery platforms operating in Spain, we observed a lack of compliance with this law regarding changes in employment conditions, and therefore a neglect of their obligations to ensure the safety and health of delivery workers, with minimal attention to training.

However, one of the platforms operating in Spain **does comply** with this regulation: **Just Eat Takeaway Spain** (23). For this reason, we requested its collaboration to analyse, together with the Platform's Management and its Prevention Service, their OSH protocols and the training provided to their workers. This has led us to propose their preventive model as an example of **best practices** in OSH, including information and training actions.

Finally, we provide a summary of the most relevant improvement proposals for this part of the SAF€RA project, particularly addressed to Labour and OSH Authorities, as well as to managers of Digital Labour Platforms.

This study is based on an analysis of Spanish legal regulations, numerous studies, statistics and guidelines from the National Institute for Safety and Health at Work (INSST) and other OSH related entities, as well as contributions from External Prevention Services and specialised Training Centres. We also considered press coverage of this business sector and opinions from workers.

In addition, the author's own professional experience has been incorporated. Over 41 years, the author has worked directly in training companies (both classroom based and distance learning/e learning), providing training for workers in various business sectors; and has developed pedagogical materials (with technological and multimedia support: CBT, videodisc, e learning) for general purposes and for industrial safety and prevention (in hazardous operations) during the period 1983–2005. The author also has extensive experience in developing software systems for information repositories and worker communication systems (1998–2005). Furthermore, the author directed the development of the "Reference Framework for Corporate Mobility and Occupational Road Safety", currently used in the Basque Country (2017–2021). In the most recent period, as head of the Spanish Technology Platform for Industrial Safety (PESI, 2008–present), the author's work has focused on organisational and technological innovation in prevention and OSH, bringing all this experience and knowledge to the development of this report corresponding to Phase 4 (WP4) of the SAF€RA Study.

1. Labour Regulations in Spain and Their References to OSH Training

As indicated in Part 1 of the present SAF€RA project on Digital Platform Work, Spain has a highly developed legal framework on occupational risk prevention (1), mainly through the following Laws and Royal Decrees:

- Law 31/1995 (2) and Law 54/2003 (3) on Occupational Risk Prevention;
- Royal Decree 39/1997 (4), Regulation of Prevention Services;
- Royal Decree 604/2006 (5) and subsequent amendments or extensions to the Regulation (RD 298/2009, 6 March; RD 337/2010, 19 March; RD 899/2015, 9 October).

In addition to this legislation, the so called **"Rider Law"** focuses exclusively on the rights of delivery workers employed by digital platforms. This is Law 12/2021 (6) of 28 September (which repeals Royal Decree Law 9/2021 of 11 May), amending the consolidated text of the Workers' Statute (7) to guarantee the labour rights of individuals engaged in delivery work within digital platforms. This Spanish Rider Law has been pioneering in Europe and served as the basis for **EU Directive 2024/2831** (8), although the European directive broadens the scope to all types of platform based delivery workers, not only food delivery riders.

General OSH legislation establishes that the required training for each job position must be identified according to its risks, as well as the minimum training needed for individuals with preventive functions, who form part of the Prevention Service and are identified in the company's Prevention Plan. The aim is to ensure they are competent in performing such functions.

Training in OSH is regulated in **Article 19**, which sets out the obligation to guarantee theoretical and practical, sufficient and appropriate preventive training, specifically focused on the worker's job or function, both at the time of hiring—regardless of the type or duration of the contract—and whenever changes occur that justify it:

"The employer must ensure that each worker receives theoretical and practical, sufficient and appropriate training in preventive matters, both at the time of hiring and when changes occur in the functions performed or new technologies or changes in work equipment are introduced." (Article 19, Law 31/1995)

Training should preferably be provided during working hours or otherwise compensated. It may be delivered internally or through external prevention services, and its cost shall never be borne by workers.

Prevention Service: OSH Management System and Training

Proper preventive management in companies, according to Law 31/1995, requires conducting risk assessments and adopting associated preventive measures. This preventive activity must be planned and carried out through the corresponding **Prevention Service**, defined in Royal Decree 39/1997.

The Prevention Service must cover four preventive specialities: A) Occupational Medicine B) Workplace Safety C) Industrial Hygiene D) Ergonomics and Industrial Psychology (which will become independent specialities under the upcoming PRL Law expected in 2026).

For delivery workers in digital labour platforms, risks and preventive measures correspond to all five areas (exposure to weather conditions, load handling accidents, road traffic accidents, musculoskeletal problems, psychosocial risks). Their OSH training must therefore be aligned with these domains.

Digital platforms should have their own Prevention Service, possibly complemented by an External Prevention Service (SPA). They may also designate certain workers—usually middle managers—as support personnel for OSH tasks. These individuals, recognised under Article 35 of the Prevention Services Regulation, may perform basic level preventive functions and can also support training activities by providing real examples of risks and situations encountered in daily operations.

To perform these functions, designated personnel must receive minimum training (Annex IV of the Regulation), with a duration of at least 30 hours (40 recommended). Many middle managers receive this training through accredited training centres or SPAs.

This is the case for digital platforms such as Just Eat Spain (23) and ALSEA Group (24), which employ most of their delivery workers directly rather than as self-employed contractors. Their

middle managers (store managers, team coordinators, workshop/warehouse supervisors) act as designated OSH personnel.

From OHSAS 18001 to ISO 45001: OSH Management and Worker Training

Companies often adopt OSH management models integrated into broader quality systems (ISO 9000, ISO 14000). The most widely adopted OSH management standards in Spain and globally are **OHSAS 18001** and **ISO 45001**.

OHSAS 18001 provides an internationally recognised framework for managing workplace health and safety. Since 2018, it has been gradually replaced by **ISO 45001:2018**, which offers a more holistic approach and better alignment with other ISO management standards.

Key aspects of OHSAS 18001 include:
- Developing and implementing policies and procedures
- Creating a workplace health and safety committee
- Conducting risk assessments
- Establishing training and communication programmes

ISO 45001 enables detailed definition of the company's Prevention Service model, including OSH policy, objectives, responsibilities, essential activities (risk assessment, health surveillance, training and communication), and annual OSH planning.

A fundamental requirement of these standards is the planning of training activities on occupational risks and health, including: – Training workers to eliminate or reduce risks (proper use of PPE, road safety guidelines for delivery vehicles). – Raising awareness of preventive culture among internal staff, subcontractors, and workers in the value chain. – Allowing diverse training modalities: courses, seminars, briefings.

Management systems also include information and communication actions, especially safety alerts regarding imminent risks (extreme weather, adverse conditions, traffic congestion, emergencies).

Software Tools for OSH Management Systems

In Spain, two national companies offer software platforms for implementing OSH management systems:
- **ESG Innova** (11), offering the HSEtool system within the ISOtools platform; and
- **Prodity Software** (12) with an OSH management module.

These platforms are compatible with OHSAS 18001 and ISO 45001 (13) and support customisation of OSH management systems and preventive protocols, including:
1. Risk Assessment
2. Emergency Plans
3. Training and Skills Development
4. Use of Personal Protective Equipment (PPE)
5. Environmental Monitoring and Control
6. Inspections and Audits
7. Incident Reporting and Analysis

Protocols apply to employees, subcontracted workers (e.g., fleet delivery workers), and should also include self-employed riders. Numerous rulings on “false self-employment” led to the adoption of the Rider Law in 2021.

INSST OSH Training Services and Prevencion10 (SMEs and Self-Employed Workers)

The Spanish National Institute for Safety and Health at Work (INSST) (14) has long offered a catalogue of **OSH training services** (14) for workers and prevention specialists, in various formats (classroom courses, webinars, workshops, conferences) and topics (PPE, risks, sectors).

INSST also provides **Prevencion10** (15) an online service aimed at improving OSH management in micro SMEs and among self-employed workers.

Prevencion10 offers: – **Evalua’t**: self assessment of risks – Autopreven t: technical guidance for compliance with “coordination of business activities” – Instruye t: free 30 hour online OSH training for basic level preventive functions, plus videos on various OSH topics – Safety recommendations (manual handling, PPE, blind spots, etc.)

Digital platforms such as **Glovo** recommend Prevencion10 to their self-employed riders, although the service is more suited to small restaurants using the platform. The self-employed rider profile is not specifically covered, and the “Transport Services” category is insufficient for rider training.

For small businesses (bars, restaurants), Prevencion10 includes a “delivery staff” profile, but risk assessment is limited to traffic accidents and basic preventive measures (vehicle inspections, compliance with traffic rules, safe driving). It does not explicitly address PPE use, weather conditions, or traffic related risks, making it insufficient for riders.

2. Digital Delivery Platforms in Spain and Risk Management for Delivery Workers (Riders)

Overview of Digital Food Delivery Platforms in Spain

The main digital food delivery platforms operating in Spain are **Glovo** (17), **Uber Eats** (19), and **Just Eat** (23); since the British company **Deliveroo** (with 3,500 riders) ceased operations in Spain at the end of 2021 following the publication of the Rider Law, but offers an interesting guidance on Road Safety for Riders (20): Deliveroo Road safety and a sound agreement with the Riders Union GMB x Deliveroo Respect Charter (20).

Other platforms with a smaller presence and fewer riders include **GoDelivery**, **Deliverum**, and **Giongo Delivery**. As early as 2021, the number of delivery workers was estimated at more than 20,000, and currently around 30,000.

In addition, Spain has numerous restaurants, chains, and food companies offering home delivery services. Many of these businesses have agreements with digital delivery platforms, although some also have their own group of delivery workers—some employed directly, but generally self-employed. Large restaurant chains with delivery services tend to have their own contracted staff, in addition to agreements with platforms.

We recommend reviewing the detailed analysis of delivery platforms operating in Spain included in the report *"Occupational Risks of Delivery Workers in Digital Platforms and Possible Solutions to Safeguard their Safety"* (WP2).

The Rider Law in Spain

The **Rider Law**, Law 12/2021, aims to guarantee the labour rights of individuals engaged in delivery work within digital platforms and establishes a series of obligations for companies operating in this sector that employ self-employed delivery workers.

These obligations seek to ensure worker safety and labour rights, as well as promote fair competition in the sector. In Spain, some of the companies affected by this law include **Glovo** (17), **Deliveroo** (19), and **Uber Eats** (18).

In summary, the Rider law establishes:

- The obligation for companies employing self-employed riders to provide accident insurance and civil liability insurance covering risks arising from delivery work.
- The obligation to provide riders with specific training on road safety and traffic regulations. Training must be free of charge and adapted to riders' needs.
- The obligation to ensure riders have access to relevant information about orders, including the exact delivery address and the amount to be received, enabling efficient work planning.
- The obligation to inform workers about safety and hygiene measures to prevent disease transmission, such as COVID 19 or other pandemics.
- The obligation to conduct a risk assessment to guarantee rider safety. This assessment must include risks related to road safety, loading and unloading goods, and exposure to hazardous substances.

Further details on the Rider Law can be found in the WP2 report.

Actions Taken by Digital Delivery Platforms Regarding the Rider Law

The position adopted by digital delivery platforms regarding the Rider Law is crucial, as it affects not only riders' employment conditions as employees but also their inclusion in OSH policies and the general prevention plan, which frames training and information actions related to worker risks.

Ultimately, compliance depends on each platform's specific strategy in OSH and its support plan for workers (prevention, training), even when they remain self-employed.

A detailed description of the case of the British platform Deliveroo, which maintains training services on risk prevention—especially road safety risks—is included in the WP2 report. That report also analyses Glovo's actions in risk management, insurance, and training.

Role of Accident Mutual Insurance Companies and External Prevention Services (SPA) in Spain

According to Spanish labour and OSH regulations, company Prevention Services—including those of digital delivery platforms operating in Spain—may rely on **External Prevention Services (SPA)**. These SPAs may also be used to design and develop training plans for

workers across the five preventive domains, although SPAs only complement the specialities not covered by the company's own Prevention Service.

Many SPAs offer a broad catalogue of OSH training, also accredited under the regulation, covering general risks and road safety risks, which can be easily adapted to rider specific risks. SPAs must be authorised by each Autonomous Community based on their accredited personnel, facilities, and materials, enabling them to provide services in the preventive specialities for which they are approved.

Accident Mutual Insurance Companies also provide awareness and training services, as well as the development of guides and support materials for the most frequent types of risks, accidents, and occupational diseases. These services help reduce accident rates and associated costs of hospitalisation, treatment, and rehabilitation, which Mutual Insurance Companies must cover for employees or self-employed workers (including riders registered as self-employed in Social Security).

Risk Management for Food Delivery Workers (Riders) and OSH

The risks faced by food delivery workers (riders), in relation to the OSH training that must be provided, can be grouped into four main categories:

a) **Physical and ergonomic risks** associated with delivery work
b) **Risks related to outdoor work and environmental conditions**, aggravated by climate change
c) **Mobility and vehicle driving risks**, especially when using personal mobility vehicles with low physical protection and short predetermined delivery times
d) **Psychosocial risks**, considered the most significant and urgent due to the nature of the work and employment conditions

Regardless of riders' employment status (formally contracted or self-employed), the company (through its organisational management via a Digital Labour Platform) must comply with OSH regulations, conducting mandatory risk assessments and establishing a Prevention Plan that includes mitigation measures and specific training actions.

Example of Adequate Safety and OSH Protocols in Delivery Work. Success Case: Just Eat Takeaway Spain

As detailed in the WP2 report, the delivery platform Just Eat Takeaway Spain has actively collaborated in this study, particularly regarding OSH management, prevention, and training for delivery workers. This section provides a synopsis.

The fact that most of its workers have formal employment contracts, strictly complying with Spanish law and the European Directive, demonstrates the company's genuine commitment to worker safety and health, as a logical consequence of compliance with labour and OSH legislation.

Just Eat's operating protocols in Spain are highly appropriate and effective. These protocols aim to improve operations and safety, although they are not automatically integrated with the platform's digital algorithms. Operations follow a mixed model of collaboration between the Prevention Service, area coordinators, and supervisors of the platform's operational systems,

supporting information and training actions tailored to both general and specific risks (weather, traffic, emergencies, etc.).

3. Planning and Evaluation of OSH Information and Training

The OSH and Prevention management plan will determine the information and training needs and objectives to be provided to the group of workers, which will be translated into a detailed, specific Training Plan.

This Training Plan will include, in a structured manner:

- General PRL objectives and improvements in OSH (across the four established risk domains), as part of an overall goal of strengthening the preventive culture among riders.
- Information and warning actions regarding potential risks (immediate or near term risks associated with delivery tasks at any given moment, depending on current traffic conditions, weather conditions, emergency alerts, and other recommendations issued by public authorities).

As with any plan, it must define training objectives, the resources to be used, the delivery method (in person, online, or blended; locations and means), and the evaluation of training outcomes for riders (indicators related to OSH knowledge of key risks, accident rates, and occupational health indicators; metrics that confirm whether minimum levels of safety, health, and preventive culture are being achieved within this group of workers). Reviewing these results (knowledge and OSH indicators) will lead to an action and improvement plan focused on areas where objectives have not been met or where there is room for improvement.

The **Vision Zero** (22) principle is highly suitable for defining the Training Plan and information actions and serves as a reference for continuous improvement.

General OSH training can be integrated into the worker onboarding system and protocol for the digital platform, along with explanations of work procedures, which must be expanded to include OSH requirements (and the system for evaluating OSH knowledge and associated training actions).

Information and punctual warning actions regarding potential risks should form part of a safety control and alert system, which we recommend be integrated into the platform's algorithms. These alerts should be triggered in connection with work orders, so that workers are aware of new specific risks and take appropriate preventive measures before performing the delivery task (preventive measures aligned with the OSH training and guidelines previously provided).

Adapting Training to Worker Profiles

All OSH training and informational actions (warnings and safety/health recommendations) must also consider personal (individual) aspects, such as:

- **Gender** (women, non-binary), an area still not well addressed in platform algorithms.
- **Age**, as most workers are young (under 40, especially under 25), but older or senior workers may also be present.
- **Digital literacy**, since although many workers may be considered digital natives, some may have significant limitations in using or understanding digital communication tools and platform messages.

- **Cultural diversity**, including different levels of education and culture (medium and especially low levels among many workers, often migrants and vulnerable groups); multiculturality must be considered according to countries of origin (Latin America, Africa, Asia), linguistic particularities (including variations in Spanish among Latin Americans), and cultural or religious diversity. This requires a degree of personalisation of training and informational resources, both in OSH and in work procedures.

In all cases, these personal characteristics—individually or collectively—must **never** be used for any form of labour or personal discrimination, in accordance with the European Directive on personal data protection and especially regarding Human Rights.

Adapting Training Modalities and Support Materials to Worker Profiles

Given the general characteristics of delivery workers, whose cultural and educational backgrounds may vary widely, and in order to achieve effective training outcomes, the plan should focus on **lower knowledge profiles** (limited preventive and safety culture), using very direct and clear messages.

The nature of delivery work means workers have limited availability and flexibility (in schedules and duration) to follow an ideal training plan, making personalised or group in person training activities difficult.

We recommend at least one initial activity with the worker, in person and individually (or in small groups), as part of the onboarding process to the digital platform. This session should emphasise the main safety and prevention principles that must guide delivery work and vehicle use (personal mobility). It would be advisable for workers to meet the **Safety Delegate** of their area, who will be their direct contact for any safety incident, accident, or health problem during work.

This initial action should also provide clear and precise instructions on the mandatory basic OSH training required by national law (Spanish legislation) and EU guidelines, along with recommendations to follow additional specific OSH training offered openly. All instructions should be provided both verbally and in writing, clearly and precisely.

Practically, the most feasible training modality for OSH will be **distance learning through telematic means (e learning)**. Training content should be structured into short learning modules (“training pills”), with simple and direct messages, real images (photographs) or realistic visuals (infographics) to reinforce concepts (defined risks, real situations, protective measures, associated preventive actions, 1 2 3 plan, ensuring compliance with action protocols, etc.). Each module should include a knowledge assessment system (e.g., test questions) to ensure the required safety learning objectives are met.

Therefore, the digital platform should provide at least an **e Learning system (LMS, Learning Management System)** accessible via riders’ mobile phones. The system should present the training itinerary to be followed, both mandatory and optional/recommended. Optional training should be emphasised through specific preventive alerts, for example related to seasonal and weather conditions (winter, summer, storms), complex traffic situations (holidays, weekends, public holidays, special events), and public safety alerts in the worker’s area. All these circumstances should have associated preventive messages issued alongside the work order (pickup and delivery).

The tele training system should identify each worker and record the training modules completed, along with the expected knowledge level for each activity. The system should inform workers of their progress, request repetition of certain modules if needed, and recommend continuing with complementary training within the defined plan.

Availability of Informational and Training Resources for Delivery Workers

In Spain, there is a significant open (free access) supply of informational and training resources (in Spanish) on OSH, covering various risks—both general and specific to digital delivery platform workers (with greater focus on mobility and road safety risks).

This extensive supply comes from official OSH bodies (national and regional institutes), business associations, External Prevention Services (SPA), Accident Mutual Insurance Companies, and professional associations of OSH specialists in Spain and some Latin American countries.

It also comes from communication companies (publications, magazines, technology information websites, digital marketing, specialised OSH publishers) and companies related to PPE or personal mobility vehicles (manufacturers and distributors offering safety recommendations).

Some digital platforms and professional collectives of delivery workers have also generated Spanish language resources in various Latin American countries, where labour precariousness has been greater due to the lack of specific labour legislation for this group, increasing the need for OSH information and training.

These informational and training resources are published in various media and formats, both physical and digital (articles, books, manuals; graphics, posters, infographics; videos such as interviews, conferences, reports, TV programmes, YouTube channels, etc.).

There is abundant content in areas such as:

- Use of protective equipment and clothing (helmet, gloves, neck warmers, high visibility reflective vests, lumbar belts, etc.)
- Driving personal mobility vehicles (scooters, bicycles, motorcycles—manual or electric, rented or owned) and their maintenance (checking wheels, brakes, steering, battery, etc.)
- Basic road safety training (public road driving rules, traffic signs, etc.)
- Customer service (greeting, communication, and farewell during package or food delivery)
- Ergonomics (handling delivery backpacks)

However, informational training resources are scarcer in other truly important areas for comprehensive OSH, such as:

- Specific risks in delivery work (described in detail, with corresponding preventive measures)
- Formal road safety training (especially when a driving licence is not required, meaning workers may not have received formal training)
- Information and action protocols for specific delivery situations or personal issues, such as:
  - Problems with customers (dissatisfaction, complaints, coercion)

- Interactions with other delivery workers or staff from partner companies (restaurants), including interpersonal issues
- Physical, sexual, or verbal aggression (during pickup, transit, or delivery), internal communication and police reporting
- Road accidents involving the rider or third parties (vehicles or pedestrians), internal communication to the platform and insurance company
- Reporting health problems or accidents and contacting medical insurance and the platform's Prevention Manager
- Psychosocial risks and action guidelines (stress, depression, etc.)
- Food safety (care and cleaning of delivery backpacks, handling food and beverage packages)
- Other OSH domains

Example of OSH Training Content (Just Eat Spain)

Below is a real example of a training plan—with mandatory and complementary actions—established by the OSH/Prevention Department of **Just Eat Takeaway Spain** (23), which we consider highly appropriate and an example of good corporate practice.

The OSH and PRL Training Plan includes the legally mandatory training (which the company must provide to all workers), together with a set of complementary training actions (a selection of training modules developed by the External Prevention Service, **ASPY**, which collaborates with Just Eat Takeaway Spain's PRL Department).

What is exemplary is the **complete training and prevention** cycle carried out by the PRL–OSH Department with all workers, including delivery workers.

a) Initial Phase: Contract Signing and Onboarding Plan

Signing the employment contract includes the delivery of a complete Risk Sheet associated with the job position and the first training linked to delivery work (Courier Learning Experience). In addition, workers are offered a protection and safety package (accident coverage, including pregnancy and breastfeeding risk coverage for women), along with **health surveillance services** (free medical check ups, with the option to decline in writing).

This initial onboarding training includes:

- Training on the applications to be used (interaction with the digital platform) • Information on equipment and vehicle
- Description of situations that may arise during delivery work and their solutions
- Non regulated OSH training:
  - Traffic signs and regulations
  - Risk perception on the road
  - Extreme weather conditions (heat, cold)
  - Attacks and threats
  - Code of conduct
  - Physical and mental well being

b) PRL Training (Online, Provided by the External Prevention Service)

This training is offered online by the External Prevention Service (SPA) responsible for health surveillance for all company workers, including delivery workers on payroll. It follows the minimum requirements established by Spanish PRL legislation (Law 31/1995, Article 19).

The SPA issues a certificate confirming completion of mandatory PRL training and information for the “Delivery Worker” position.

This initial training includes, in addition to mandatory content, specific modules such as:
- Description of the job’s Risk Sheet
- Manual handling of loads
- Road safety recommendations for vehicle driving
- *In itinere* traffic accidents

This additional training is based on several short modules (“training pills”):

Training Pill 1: PRL in Manual Handling of Loads
› Safe lifting
› Manual handling measures
› Postural hygiene
› Other recommendations

Training Pill 2: Road Safety Recommendations for Vehicle Driving
› Consequences of mobile phone use while driving
› Motorcycle driving
› Safety recommendations for cyclists
› Safety recommendations for users of scooters and other personal mobility vehicles
› Action in case of an accident

Training Pill 3: *In Itinere* Accidents
› Pedestrians
› Drivers
› First aid in case of traffic accidents

c) Delivery of Work Uniform and PPE

Once both internal and accredited PRL training have been completed, workers receive their uniform and PPE, adapted to the season of the year:
- Certified helmet
- Waterproof jacket with reflective elements
- Gloves with mechanical protection
- Waterproof trousers

d) Additional Safety and PRL Information

Over time, workers receive informational leaflets on other important aspects of delivery work and safety, such as:
- Driving recommendations for delivery work
- Recommendations for using motor and electric motorcycles
- Safe work instructions
- Basic driving rules (bicycle and scooter)

- The “10 Golden Safety Rules”
- Vehicle user manuals

e) Complementary PRL Training (in collaboration with the Accident Mutual Insurance Company ASEPEYO)

This training aims to improve workers’ PRL knowledge and prevent accidents. It includes two approaches:

Awareness Sessions (Online) for Delivery Workers
- Information on all types of accidents
- Injury reports
- Severity of the most significant accidents
- Examples of accidents
- Ways to prevent accidents
- Efficient use and care of PPE

Training for Safety and Health Coordinators (Theoretical–Practical)
- First aid
- Fire extinguishing

Initial Recommendations (Training systems in the Platform)

As stated earlier, our initial recommendation is that the digital platform integrates Prevention and OSH management systems, as well as the awareness and training plan (with all specific training actions).

However, it is equally valid for OSH management and preventive training to be directed from the corresponding OSH Department, with its own prevention specialists (trainers) and Prevention management systems.

Regarding coordination with external OSH services—handling accident cases, occupational health issues, and health surveillance (medical check ups)—we recommend embedding this management within the digital platform’s systems.

Similarly, the development of the awareness and training plan specific to delivery workers should be part of the platform’s management system. Choosing an external collaborator offering training services (in person and/or via an appropriate tele training system) with personalised monitoring of training progress is also valid.

What is essential is the **appropriate selection of training actions and modules** that cover the required safety and PRL knowledge for delivery workers.

Safety and Prevention Alerts System for Delivery Activities

As previously indicated, it is highly relevant to include **information and warning actions** alongside the Prevention and OSH training plan.

These alerts are time sensitive and linked to delivery tasks, based on higher risk situations such as traffic conditions, weather conditions, emergency alerts, or public authority

recommendations (road works, traffic diversions, restricted access zones due to public events or serious incidents).

This relevant information is increasingly accessible as **open data sources**, thanks to the digitalisation of public services (municipal and general citizen information). Private portals also provide such information, such as **Google Maps** (local traffic, route management, incidents, delays due to congestion or road works) and similar services. New public private digital platforms also provide information on street conditions, road works, public events affecting mobility, emergencies, and safety issues.

All European countries—and some regions or major cities—have meteorological agencies providing detailed weather forecasts (temperature, wind speed, precipitation type and probability) with hourly predictions.

These information sources are highly relevant for OSH and road safety in outdoor and transport related work (including food delivery). As open data, they can be integrated into digital labour platforms, enabling preventive measures and specific recommendations to be associated with each delivery action.

However, modifying existing platform algorithms can be complex and costly -technologically challenging for automatic integration (linking delivery-management systems with new alert systems and external information sources), and especially difficult due to real time parameterisation of situational values (traffic and weather) linked to risk typologies and severity levels.

New **AI applications** may help integrate safety alert systems as public information services (mobility, traffic, weather, incidents, security issues) become more consolidated and offer technological interfaces for external systems such as digital labour platforms.

A practical alternative for now is for platform operators -with access to the automatic order management system- to monitor traffic and weather information and send punctual alerts when evident risks arise. This requires adapting algorithms to allow manual insertion of additional alerts linked to work orders.

With this functionality, safety alerts could also be triggered by Prevention staff or OSH coordinators, who could provide preventive recommendations to platform operators.

Participation of the Prevention and OSH Service in platform operations also facilitates management of delivery worker accidents and health issues, handling sick leave due to accidents or illness, communication with insurance companies and Accident Mutual Insurance Companies, and reporting incidents to Labour Authorities (a legal requirement for the platform company through its Prevention Service).

4. Final Recommendations to Labour and OSH Authorities

We consider it extremely important for Labour and OSH authorities to expand existing national (and regional) regulations in line with the recommendations of the European Union and its recent Directive. This has already been carried out in Spain in an anticipatory manner.

We also recommend reviewing the various analyses and studies conducted by EU OSHA in recent years -some of them recently published- which should serve as a basis for developing practical Technical Guides by national (and regional) OSH Institutes for companies employing delivery workers. Their dissemination should be broadened through Occupational Safety and Health Professional Associations.

Labour Administration actions should aim to compel digital platforms to change their current employment conditions and formally hire these workers (riders), or at least hire a very high percentage of them, leaving only those who -due to individual circumstances- wish to remain self-employed. However, this should not exempt platforms from offering adequate OSH and road safety protection services to self-employed workers.

This widespread change in employment conditions requires the existence of a specific Prevention-OSH Department within digital platforms, providing minimum safety, prevention, and occupational health services, along with proactive action protocols, an adequate training plan for all riders, and a system of safety and health alerts and recommendations adapted to real time situations. In short, a digital platform company committed to the safety and health of all its workers.

Evidently, this commitment to worker safety and health entails significant costs that some digital platforms are unwilling to assume, as they seek to maximise economic results with minimal labour obligations. This is precisely what the European Directive aims to prevent and must be translated into the national legislation of EU Member States in practical terms.

However, the problem also has another dimension -not labour-related, but social- stemming from citizens who use delivery services (food delivery and similar services such as parcel delivery for online purchases). The current digital society, strengthened during the pandemic but already expanding due to the growth of digital communication and e-commerce services, is not aware of the importance of OSH for delivery workers nor of the risks of this activity (physical, road-related, and psychosocial) under generally adverse conditions (traffic, weather, night time schedules…). Prioritising express delivery over the simple convenience of home delivery generates demand for delivery times that are almost impossible to meet. This speed in delivery is indirectly promoted by platforms as a key element of service “quality”, without considering delivery safety and forcing maximum speed, which increases risks for riders.

For this reason, we must propose institutional awareness campaigns aimed at society -especially users of digital shopping and delivery services, teenagers and middle-aged population- highlighting the importance of delivery-worker safety over shorter delivery times, given that in most cases a slight delay is acceptable and not a serious issue.

At the same time, we must seek greater commitment from digital platforms to assume responsibility for delivery safety and rider health, avoiding the temptation to use delivery speed as a competitive advantage, knowing that increased speed is associated with higher road accident risk, in addition to psychosocial and health risks linked to greater algorithmic pressure on riders.

Summary of Recommendations to Labour Authorities

Regarding employment and OSH conditions for workers in digital labour platforms, we outline the following basic recommendations:

1. **Promote the regularisation of employment status** for the largest possible number of delivery workers through formal employment contracts.
2. **Require digital platforms to provide minimum OSH and preventive training services** to all delivery workers, regardless of their employment status.
3. **Promote new training resources and dissemination tools for OSH and road safety training**, aimed at delivery workers and usable by digital platforms, especially local companies with fewer OSH resources.
4. **Foster technological innovation** to integrate OSH and road safety parameters into platform algorithms, and to personalise training and safety-alert services.
5. **Seek consensus among digital delivery platforms** to prioritise worker safety, prohibiting communication or marketing campaigns that directly or indirectly promote delivery speed as a differentiating element of their service.
6. **Develop awareness campaigns for civil society**, especially young and middle-aged users (the main users of digital delivery platforms), using appropriate media such as social networks and influencers, to convey clear messages about prioritising delivery worker safety over delivery speed. The social cost of unsafe conditions (traffic accidents, medical costs, insurance costs…) is far greater than the small benefit associated with convenience and rapid delivery.

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10. ISO 45001:2018 : https://www.iso.org/standard/63787.html

11. ESG Innova (platform “ISOtools” that include HSEtool: https://hse.software/)

12. Prodity Software (OSH Management system): https://proditysoftware.com/soluciones/seguridad-y-salud-sst/

13. These platforms (ESG and Prodity) are compatible with OHSAS 18001 and ISO 45001 https://www.softwaredoit.es/prodity/prodity.html y https://isotools.org/pdfs/soluciones-software/iso-45001.pdf

14. Spanish National Institute for Safety and Health at Work (INSST) https://www.insst.es

15. INSST OSH Training Catalogue https://www.insst.es/formacion

16. INSST online service Prevencion10: https://www.prevencion10.es/

17. Glovo, https://glovoapp.com/ and https://glovoapp.com/es/ (Spain)

18. Uber Eats, https://www.ubereats.com/

19. Deliveroo: https://deliveroo.co.uk/

20. Deliveroo Road safety, https://riders.deliveroo.co.uk/en/road-safety); and GMB x Deliveroo Respect Charter. https://riders.deliveroo.co.uk/en/respectcharter,

21. RTVE: articles and TV documental on Riders & digital Platforms
22. Vision ZERO promoted by ISSA (www.issa.int) https://visionzero.global/

23. Just-Eat España (https://www.just-eat.es/)

24. Grupo empresarial ALSEA, https://www.alsea.net/)

25. Easy Rider (https://easyrider.app/)

26. Job & Talent (https://www.jobandtalent.es/)

18 Temporary Agency Work and Safety Learning in Finland

Temporary Agency Work and Safety Learning: An Inter-Organizational Perspective within Warehousing in Finland

Riikka Ruotsala, Laura Seppänen & Pia Perttula

Abstract— The chapter examines safety learning in the context of temporary agency work (TAW). Previous research has addressed the poor OSH outcomes and complexities of the triangular employment relationship in TAW. Through qualitative data from interviews and a workshop, the qualitative case study explores how inter-organizational collaboration between a staffing agency and a client company can enhance safety learning for temporary agency workers. Key outcomes highlight the importance of collaboration, the potential of digital tools, and the need for a comprehensive, tailored approach to learning. The study suggests that inter-organizational collaboration and joint evaluations are essential for fostering a strong safety culture in TAW.

INTRODUCTION TO THE CASE STUDY

In this chapter, we further examine the dynamics of occupational safety learning[7] in fragmented work settings. However, the focus is shifted from the previous studies of platform-mediated food delivery work to an analysis of temporary agency work (TAW) within warehousing in Finland. TAW is characterized by a triangular contractual relationship involving the temporary work agency (employer), the temporary agency worker, and the user firm (Strass-Raat, 2019). Here, to better fit the organizations involved in the study, we also use the terms staffing agency/company and client company. In practice, the temporary agency worker is employed by the staffing agency but works in the client firm under its supervision. Regarding occupational health and safety (OSH), the responsibility for the employer's obligations is shared between the staffing company and the user company (Forst et al., 2023). This shared responsibility for OSH serves as the starting point of this qualitative case study, which draws on interview and workshop data. The data provides an inter-organizational perspective to TAW, offering insights into the collaborative efforts between a staffing agency and a client firm to advance agency workers' safety learning. This focus is essential, as previous research has highlighted that, among various concerns, unclear OSH responsibilities, poor induction and insufficient safety training are significant challenges in TAW (Cajander et al., 2023a; Forst et al. 2023; Hopkins,

[7] In this chapter, we use the concepts of 'occupational safety learning', 'OSH learning' and 'safety learning' as synonyms.

2017). While recent studies have also identified facilitators for protecting temporary workers OSH (e.g. Menger-Ogle et al. 2023), there remains a need to develop consistent practices to ensure legal compliance and strengthen collaboration between staffing agencies and client companies to support OSH (Cajander et al, 2023b; Kärkkäinen et al., 2024). This study aims to fill this gap by examining inter-organizational collaboration and its potential to advance OSH learning. The research question is: How can a staffing agency and a client firm collaboratively enhance temporary agency workers' safety learning? Ultimately, based on the findings, the study aims to leverage good practices to advance safety learning both within TAW and across other fragmented contemporary work settings.

In the following sections, we first discuss OSH in temporary agency work focusing on the perspectives of learning and induction. Next, the context of the study, data collection and analysis are described. This is followed by the findings from the interviews and workshop. Finally, we conclude with insights drawn from the study.

Managing occupational safety in TAW: A learning perspective

The use of temporary agency work has increased as organizations seek cost-efficient ways to manage changing market conditions by adjusting staffing levels (Houseman, 2001). TAW may involve short-term gigs with different employers or long-term work at a single workplace. As TAW is applied across industries, encompassing in a diverse set of job tasks and work environments, safety issues are partially context dependent. However, there are also general characteristics. Overall, TAW is associated with poor OSH outcomes and practices; for example, an increased risk of occupational accidents has been identified (Underhill & Quinlan, 2011). Several studies have explored this phenomenon, focusing on its underlying mechanisms and explanatory factors (Foley, 2017). While we acknowledge this aspect, we will not delve into it in detail here. However, it is noteworthy that also in Finland, the frequency of workplace accidents in the sector involving TAW is higher than the average across all industries (Hintikka, 2011; Sysiaho, 2022; Korpela, 2025). The majority of these accidents occur in production tasks, as well as in jobs related to storage, loading, and unloading in the designated work environments (Sysiaho, 2022). Thus, there is a call for focused accident prevention in TAW (Hintikka, 2011).

The triangular employment relationship in TAW has been noted as a challenge from the OSH management perspective (Cajander et al., 2023b). Although in TAW the employment relationship exists in the traditional sense between the employer and the employee, the shared employer arrangement presents several obstacles in terms of ensuring occupational safety; for example, insufficient safety training, poor personal protective equipment, and unclear supervisory roles have been identified (Hopkins, 2017). In their study on restaurant work in Finland, Cajander et al. (2023a) found that temporary agency workers experienced confusion and uncertainty about which supervisor (agency or user company) was responsible for specific matters. Furthermore, temporary agency workers found it stressful to repeatedly familiarize themselves with new working methods and workplace cultures when changing workplaces. (Cajander et al., 2023a). This implies that providing adequate induction and safety training needs particular attention in situations where temporary agency workers frequently switch between client firms or work for a firm only for a short duration.

Safety learning is typically operationalized as safety induction (including general awareness as well as site- and job-specific induction) and safety training. This approach aligns with the safety management framework. In Finland, the Occupational Safety and Health Act (738/2002)

mandates that employers have a duty to take care of the safety and health of their employees. This involves considering work-related circumstances, working conditions, and other aspects of the working environment, as well as the employees' personal abilities. The Act also applies to temporary agency work (TAW) and requires that the user firm must, before the work begins, define the occupational qualifications and specific features of the work and communicate these to the employer (temporary work agency). Then, the employer must inform these to temporary agency worker and ensure that the worker has the necessary occupational skills, experience and suitability to perform the job.

In practice, induction and safety training are processes through which employees acquire basic OSH knowledge necessary for their work, including work-related hazards and risks, work instructions, and the use of personal protective equipment. In Finland, the Occupational Safety and Health Act (738/2002, section 14) refers to ‘instruction and guidance to be provided for employees.

Given this legal framework and acknowledging the shared employer responsibility in TAW, the temporary work agency is responsible for giving the general orientation, while the user firm is responsible for on-site induction and job-specific training. Traditionally, this approach implies that employees are recipients of training and guidance, but pedagogically, fulfilling the legal obligation can be approached in various ways. This also underscores the need for 'unpacking' and giving more attention to effective and meaningful safety learning. Key considerations include whether employees are viewed as passive recipients or active agents in the learning process. Additionally, the timeframe of the induction process is crucial; what content can be internalized within an hour, a half a day or prolonged period? What kind of instructive methods and learning environments or a mixture of those are applied: discussions, classroom settings, e-training, virtual learning, gamification, peer discussions, or experimental learning in real work environment? Importantly, how does safety learning progress beyond initial orientation and job-specific training?

Answering these questions–viewing OSH in TAW through the lens of learning–requires an approach where learning is addressed not only at the individual level, but also through organizational and inter-organizational learning practices. However, as discussed in the introduction (Chapter 13), it is relatively rare that the concept of learning is thoroughly theorized or explicitly defined in terms of what learning encompasses.

DATA AND METHODS

The aim of the study was to examine safety learning in the context of TAW within warehousing in Finland. The study involved two companies: a staffing agency and its client company, both operating in the warehouse sector. The study sought to understand how shared OSH responsibilities are realized between the companies, while also exploring the potential of inter-organizational collaboration to enhance the safety learning of temporary agency workers. The data was collected through interviews and a joint workshop session.

Data collection

In the first phase of the study, semi-structured interviews (n=8) were conducted with representatives from both involved companies, as well as with temporary agency workers. The company interviewees held various roles, including senior and line management, as well as human resources and occupational safety practitioners. Each interview lasted approximately

one hour and was recorded and transcribed. The aim of these interviews was to gather relevant information to be further processed in a joint inter-organizational workshop session. The interview themes covered occupational safety learning, its practical implementation (including the role of software application of the staffing agency), the main safety learning practices, and potential new ideas for developing safety learning in TAW.

In the second phase of the study, a half-day workshop was conducted based on the theory of expansive learning (Engeström, 1987). The aim of this session was to elaborate on the findings from the interviews, model the induction process, and discuss safety learning from the perspective of shared OSH responsibilities. The researchers facilitated the workshop, which was arranged in a hybrid format to enable both in-person and online participants. Five participants from the companies attended the workshop.

DATA ANALYSIS

The transcribed interview data was organized into thematic categories that corresponded to the main topics of the interview framework. The analysis was an iterative process which included the following three phases. First, each speech turn was examined from the perspective of OSH learning using the activity system model (Engeström, 1987), identifying subject (here, who learns), the object (what is learned), the means and tools (how learning occurs and is supported), and the rules (why learning takes place), community (who are involved) and division of labour (what the involved parties do). Next, challenges and new ideas related to OSH learning were identified. This combined analysis produced the main aspects to be further discussed in the joint workshop: shared employer responsibility within TAW and the comprehensive view on induction process. The transcribed workshop data was analyzed from the perspective of interorganizational cooperation; the initiatives for advancing the induction process and safety learning for temporary agency workers were identified.

FINDINGS

Interviews: Shared employer responsibility

Both companies emphasized the importance of the OSH legislation, which mandates obligations for both parties. Shared employer responsibilities and occupational safety obligations were well comprehended and managed. The interviewees from the staffing agency emphasized that, generally in the context of TAW, it is important to increase understanding that the work and working conditions of temporary agency workers must be organized in the same manner as those of the client company's own employees. Regarding temporary agency workers, the staffing agency utilized a specific software application that streamlined tasks related to the employment relationship, such as recording work hours. Additionally, the application featured tools related to OSH, such as safety materials, videos and safety observations. It was emphasized that the application is crucial because it enables the management of the employer's obligations and its share of responsibilities within shared employer arrangements.

Interviewees from the *client company* emphasized that the occupational safety of temporary agency workers is managed in the same way as that of their own employees. Given the numerous potential hazards in warehousing work, the successful implementation of the site-specific induction and guidance was highlighted to ensure a safe and healthy working environment. The company was dedicated to continuously developing safety and it maintained

various practices, including safety training, a safety observation process, and daily meetings, to keep safety matters at the forefront.

Temporary agency workers underlined the importance of a well-managed induction process and continuing guidance at the workplace. Additionally, the atmosphere that encourages questions and discussions about safety was appreciated. In the client company, temporary agency workers equally participate in meetings where work and safety are discussed. As for the staffing agency, workers found the application and safety-related materials useful.

Interviews: Induction process as a focus of safety learning

Interviewees from both companies were motivated to explore new opportunities alongside traditional methods, aiming to ensure safety learning is both effective and meaningful. Various practices were mentioned, including an active safety observation process, safety training sessions, and both informal and formal discussions. The induction process emerged as a key focus, with both parties recognizing their critical role in its implementation and seeing it as an opportunity for further development and inter-organizational collaboration.

The *staffing agency* interviewees emphasized the current role of their application in integrating OSH material and safety-related videos, expressing motivation to leverage its potential further to diversify materials and enhance safety learning in the future.

The *client company* interviewees pondered the possibility of integrating 'pre-orientation' materials into the staffing agency's application, allowing temporary agency workers to familiarize themselves before their first arrival at the workplace. However, it was stated that the induction process primarily occurs on-site.

As interviewees proposed ideas to enhance the induction process beyond current practices, aiming to establish 'best practices' that exceed minimum legislative requirements, the induction process was selected as the main topic for joint review in the workshop.

Workshop: Creating a joint perspective to advance safety induction

In the workshop, the comprehensive induction process was visually modelled from the perspective of the temporary agency worker. First, the main stages and elements of the induction process were outlined separately by both companies. The staffing agency's representatives mapped out the general induction process, while client company concentrated on-site induction process.

The *staffing agency* participants noted that engaging with temporary workers on OSH and introducing the safety culture should begin during the recruitment interviews. This involves introducing the ‘safety mindset’ and detailing the OSH practices such as making safety observations and reporting accidents, as well as familiarizing them with job- and workplace-specific personal protective equipment. The staffing agency applied both face-to-face interactions and a digital application to facilitate safety learning.

At the *client company*, the on-site induction process comprised a general introduction to the worksite as well as specific job-related training, with OSH issues integrated throughout. As employees were introduced to the company, the work environment, supervisors, and colleagues, establishing a positive and relaxed atmosphere was considered crucial for fostering

mutual familiarization. Specific on-the-job training was provided to enable workers to manage their tasks independently. In addition to the induction process, safety learning was integrated into daily operations, with daily meetings where safety observations and measures were jointly discussed. Additionally, the client company maintained its own safety training program.

The participants valued that ‘safety mindset’ was emphasized as a central element of induction from both sides. The discussion led to development ideas for enhancing collaboration, particularly in treating induction as a continuous process from the perspective of temporary workers. One idea for ‘bridging’ was to better utilize the application in collaboration, such as by making site-specific induction materials from the client company more accessible through the app. Another suggestion was to use the app to send a question to temporary workers after their first few days to get feedback on the induction. This would give companies an additional way to monitor and improve the process. A third idea focused on producing videos that cover the work environment, specific industry characteristics as well as safety-related issues. Participants assessed that the first two ideas were relatively straightforward to implement, as the application provides a technical solution. Video materials were seen as a valuable tool for introducing safety perspectives, but their implementation would need more planning and resources. In addition to generating practical ideas, the workshop helped participants gain a better understanding of the importance of collaboration between companies in ensuring successful induction.

DISCUSSION AND CONCLUSION

Poor OSH outcomes in TAW have prompted research to better understand the challenges on the triangular employment relationship involving the staffing agency, temporary agency worker, and client company. Several studies have identified unclear OSH responsibilities, inadequate induction, and insufficient safety training as key challenges in protecting temporary agency workers' OSH (e.g. Hopkins, 2017; Menger-Ogle et al., 2023). Additionally, research has generated recommendations and proposed practical solutions. For instance, conducting client assessments and site visits, providing OSH training for temporary workers and internal staffing company employees, fostering frequent communication and relationship building between staffing companies, host employers, and temporary workers have been proposed as means to improve OSH in TAW (Menger-Ogle et al., 2023). Overall, there is a recognized need to develop collaboration between staffing and client companies (Cajander et al., 2023b; Kärkkäinen et al., 2024). This case study contributes to the topic with the following three main outcomes:

First, the study emphasizes the importance of *inter-organizational collaboration* between staffing agency and client company to enhance safety learning in TAW. Given that safety learning, particularly the induction process, is divided between these companies, a collaborative approach can be beneficial. In this study, the companies expressed interest in exploring safety learning methods that extend beyond mere regulative compliance. Consequently, the focus was on identifying possibilities and good practices. This aligns with the remark by Cajander et al. (2023b), who suggest that a practical approach moving forward would be to develop better OSH cooperation models, information-sharing channels, and practical tools between staffing agencies and user companies. Our study demonstrates that development-oriented workshops can serve as an arena for inter-organizational learning, making them a valuable addition to more formal cooperative practices, such as regular meetings.

Second, the study addresses *the role of digital applications*. In this case, the digital application of the staffing agency was a promising way to enhance inter-organizational collaboration, and in this way to improve temporary agency workers' resources for safety learning. However, the use of the application as a learning platform raises new questions. From the workers' perspective, digital means may not be as meaningful as social interactions. Evaluation of digital materials' efficiency in promoting workers' OSH learning needs its own pedagogical designs.

Third, the study suggests that *safety learning is a comprehensive and tailored process*, rather than one-size-fits-all solution. It should be considered an ongoing process that incorporates various phases and methods tailored to support effective and meaningful learning. However, it is important to recognize that ideal processes may not always align with everyday work realities. For instance, competence assurance may remain inadequate in shared employer arrangements or depend too much on the temporary agency worker's own initiative. Therefore, successful safety learning requires consistent and transparent practices among all parties involved. As in this study, a joint evaluation of the existing practices and a shared interest in developing a strong safety culture in TAW serve as a good starting point.

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Conclusions

19 Safety Studies for Riders in Four European Countries

Coen van Gulijk & Mairi Bowdler

This final chapter of this book returns to the main question of the SAF€RA project: *which factors influence occupational safety for platform workers, and how are these factors shaped by legal, policy, technical and learning instruments?* The preceding chapters have answered this question from different angles: legal regulation and employment status, occupational safety risks and benefits, algorithmic management and platform software, everyday safety learning, and inter-organisational forms of safety management. Bringing these strands together, the conclusion argues that occupational safety in platform work cannot be understood through any single lens. It depends on how laws are implemented, how platforms are technically designed, how work is organised, and how workers, platforms, clients and regulators learn from emerging risks.

In this way, this final chapter does not provide separate answers to each research question, but synthesises the findings across the book to show how legal, technical and learning instruments interact in shaping safer and fairer platform work.

European laws to regulate algorithmic management

Even if the technology to support algorithmic management has been around for a while, the legislative framework is relatively new. Europe is at the forefront of the development of regulatory framework and has developed strong legislation to defend the rights of its citizens, specifically those that are employees.

Parts 1 provides insights into efforts to the health and safety of employees that are subject to algorithmic management. The chapters within part 1 shows that different member states have adopted different attitudes, approaches and solutions to protect employers' rights and have developed different methods and frameworks. Despite that, the underpinning European laws are the same. The contributions to this work consider four to be the key European laws to protect employers' rights in relation to occupational health and safety when they are subject to algorithmic management.

Historically, the Framework directive[8] was, and remains to be, the most important law to protect the health and safety of employees (*see Part 1*). That law requires employers to assess risks that may occur in their workplaces, to provide protections against those risks, to eliminate risk and accident factors and to consult employees in important decisions that may have an effect on safety. Those key elements remain important when considering algorithmic management.

[8] European Commission. (1989b). Directive (EU) 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:01989L0391-20081211

The Platform directive[9] is also of key importance for employers working with algorithmic management. It does not contain much information about health and safety but it is key to the central discussion about algorithmic management, and especially platform work: is the labourer an employee or self-employed? Self-employed means being someone who independently offers their services to multiple clients and bears responsibility for their livelihood, health and safety themselves. The self-employed is free to make their own choices about work but also have to take care about their social securities. The employee works under the instructions, and responsibilities, of the employer where the employer is legally bound to provide certain social securities. Health and safety provisions being the important one for this particular discussion. The issue being that platform providers prefer to limit the freedoms of their workers by prescribing tight instructions and controls whilst evading social security responsibilities. The Platform directive stipulates when the work relation between the platform and the worker should be treated as an employment relationship: namely when the platform executes control over the execution of work. For instance, by determining the level of compensation, determining the appearance of workers (uniforms), monitor the quality of the work, limits the workers' rights to organize the work by themselves, or limits the potential client base that a self-employed person could develop. In essence, the Platform directive prohibits platform firms to escape their obligation towards the people that work for them. Note that uniforms, or monitoring the quality of work, in themselves, have little effect on health and safety but if a worker is an employee, the organisation they work for is obliged to provide health and safety services and protections as demanded by the Framework directive. A self-employed person would go without such protections and have very few safety learning instruments at their disposal.

The third law is the GDPR regulation[10]. This law has been enforced since 2018 and has been transformative in the way that organisations deal with personal information, how they process it and how long they can keep it for. This is especially relevant in relation to digital work support tools where an individuals' performance and well-being are monitored (*see Chapters 2, 3 & 4*). As there are limits to processing such data which also limits infringements on personal lives, using the data at the detriment of an individual or sharing it to inhibit professional development.

The fourth and final law that is treated in this framework is the AI regulation[11]. It is only briefly discussed in the contributions by each country in this work, each sensing that it will be important in the future. Given that work instructions, checks and evaluations are algorithmically administered, the use of AI is a logical step. The AI regulation allows the use of data about employees' performance but only after a strict risk analysis and implementing protective measures against illegal use of data.

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[9] European Parliament and Council of the European Union. *Directive (EU) 2024/2831 of 23 October 2024 on improving working conditions in platform work*. Official Journal of the European Union, L, 2024/2831, 11 November 2024. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32024L2831 [Accessed 22 September 2026].

[10] European Parliament and Council of the European Union. *Regulation (EU) 2016/679 of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).* Official Journal of the European Union, L 119, 4 May 2016, pp. 1–88. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016R0679 [Accessed 22 September 2026].

[11] European Parliament and Council of the European Union. Regulation (EU) 2024/1689 of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act). Official Journal of the European Union, L, 2024/1689, 12 July 2024. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32024R1689 [Accessed 22 September 2026].

National viewpoints on regulatory frameworks

Part 1 chapters present national perspectives from the Netherlands, Spain, Finland and Norway. Each project partner gathered views on occupational health and safety for people working under algorithmic management. While some concerns overlap, the chapters show clear differences in how problems are understood and how solutions are proposed.

A central issue across the countries is the nature of the employment relationship. Almost all stakeholders discuss the Platform Work Directive and consider how it may affect workers' status. The key argument is that people working through platforms, and therefore subject to algorithmic management, should preferably do so within a formal employment relationship. Dutch stakeholders emphasise that, in the Netherlands, formal employment provides not only OSH protection under the Framework Directive, but also safeguards against excessive working hours and unlawful work arrangements. It also enables labour inspectorate oversight, worker representation through works councils, and easier access to collective bargaining via trade unions.

Spain has been particularly active for the protection of delivery workers, also known as 'riders.' Several safety investigations were performed in Spain (*see Chapter 3*) and in close collaboration with EU-OSHA, a list of OSH challenges is presented in their chapter. Alongside specific investigations in relation to the risks of delivery workers there was much attention for gender, nationality and age. Citing work done in the ILO, Spain concludes that algorithmic management especially penalizes women and detects racism against migrant workers.

In Finland, transparency is a prevalent topic. Workers want to know on what grounds individual tasks are offered to them and whether they are paid sufficiently for those tasks. It was found that remunerations vary on the basis of their personal performance in the past. Transparency is also found important in relation to (unfair) dismissal and (financial) retaliations (*see Chapter 4*).

Norway also highlights the central importance of the employment relationship in platform work (*see Chapter 5*). The chapter discusses how Norwegian labour law approaches the distinction between employees and independent contractors, and how this affects workers' access to OSH protections. Particular attention is given to the role of EU-level regulation, including the Platform Work Directive, and its potential implications for national approaches to platform work. The Norwegian perspective shows that, while the same European legal framework applies, questions remain about how algorithmic management, worker status and employer responsibility should be interpreted and enforced in practice.

In addition to the points discussed in Spain, Finland and Norway, Dutch stakeholders also worry about privacy. Even if the discussion in the Netherlands is connected to transparency, they are particularly concerned about continuous monitoring, the provisioning of relevant information and amassing personal data. For the Dutch, the GDPR regulation is as important for in the implementation of algorithmic management as is the platform directive. From this, we conclude that stakeholders in these countries discuss similar topics, but with varying national priorities.

Risks with algorithmic management

In Part 2, the four participating countries each carried out in-depth research into the risks associated with algorithmic management, with particular attention to traditional platform work in delivery services. The findings show that many risks recur across countries, although their specific forms and impacts vary by national context. The analysis identified the following negative consequences in the four countries studied:

- Injuries following to slip-trip-falls, collisions in traffic, substandard work equipment (e.g. faulty bicycles), unfamiliarity with work equipment (e.g. never cycled before or for a long time), and distractions during driving from the platform software. These risks may be aggravated, or insufficiently prevented, by inadequate personal protective equipment (PPE), failure to use available PPE, substandard work equipment such as faulty bicycles, unfamiliarity with work equipment, and distractions caused by platform software while driving. Relevant incidents include slip, trip and fall accidents, as well as collisions in traffic.
- Fatigue and strains or damage to the musculoskeletal system caused by heavy lifting, high work intensity, and long working hours.
- Hyper- or hypothermia by adverse weather conditions or unsuitable clothing.
- Stress, attention depletion, burn-out and other forms of psychosocial strains from various causes including high time pressure, competition between colleagues, opacity of platform decisions, aggression from customers on in traffic, boredom, working unsociable hours, language barriers, racism, and limited social support.

Given that the four investigations focused on delivery workers, it is unsurprising that these adverse consequences were identified across all four countries. This focus was a deliberate choice in the research design and is justified by the high accident rate among delivery workers, particularly those using bicycles. However, the findings also reveal clear national differences. In the Netherlands, particular examination was on the provision — or absence — of adequate work equipment, including poorly maintained bicycles, faulty brakes, and the lack of helmets, high-visibility clothing and general maintenance (*see Chapter 6*). Norway identified an imbalance between the demands placed on workers and the resources available to them, affecting cognitive load and workers' sense of autonomy negatively (*see Chapter 7*). Finland observed psychosocial risks, including stress and attention depletion resulting from high algorithmic job demands that are often opaque and, at times, unfair (*see Chapter 8*). In Spain, key physical, organisational, traffic-related, psychosocial, and discrimination-related risks were assessed, with corresponding preventive measures proposed (*see Chapter 9)*.

Analysis Frameworks

Interestingly, the studies use different theoretical frameworks yet identify broadly similar risks for delivery workers. This variation suggests that developing safety lessons for algorithmic management and platform work remains challenging. At present, there is no established risk assessment framework for this area, although such a framework may be exactly what is needed in the European context.

The Dutch approach follows an established OSH framework, considering a range of risk-influencing factors such as environmental risks, faulty equipment, personal characteristics, behaviours and management systems. The Dutch chapter concludes that traditional OSH risks associated with delivery and transport work are exacerbated by the high demands imposed by platform algorithms (*see Chapter 6*).

Starting with Norway, the investigators use a balancing model to examine the burden of work. The JD-R model, or Job Demands–Resources model, has shown value in earlier research by Nielsen and Kongsvik (2023). Its central concern is whether workers are provided with sufficient resources to meet the demands placed on them. The Norwegian chapter finds an imbalance: workers have few resources available, which contributes to health and safety problems (*see Chapter 7*).

The Finnish authors structure their findings around the piece-rate business model. In this model, an individual task — in this case, a delivery — is treated as a unit of work, or “piece”. Work therefore becomes a chain of consecutively completed pieces. As multiple workers compete for the same pieces of work, this creates intense competition with consequences for workers’ health and safety. The opacity surrounding how individual tasks are allocated, based on factors such as ranking, previous performance and the proximity of other workers, contributes to a highly competitive work environment that is stressful, physically demanding and encourages risk-taking (*see Chapter 8*).

Unlike the other approaches, the Spanish perspective is not centred on a single theoretical framework. Instead, it adopts a broader occupational risk prevention perspective, examining physical, organisational, traffic-related and psychosocial risks associated with platform work, while also exploring measures to manage and prevent these risks. Particular attention is given to vulnerable groups and the ways in which algorithmic management may reinforce existing inequalities (*see Chapter 9 &10*).

Although different frameworks are used to analyse and understand the effects of algorithmic management and platform work on the OSH of delivery workers, the findings are broadly similar. Across the chapters, algorithmic management is shown to intensify traditional OSH risks, whether these risks are physical or psychosocial in nature.

Solutions for improved OSH

The solutions investigated by Finland and The Netherlands follow the spearpoints in their investigations. Finland focuses on solutions to improve transparency of the implemented algorithmic management (*see Chapter 11*), the Netherlands focuses on systems to improve OSH learning (*see Chapter 12*).

Information provision to improve transparency

Delivery workers benefit from receiving relevant information before accepting a shift or task. Before a shift starts, information about expected weather conditions and workload can help workers assess the type of shift they are about to begin. Access to a planning office or other support function can also be useful for questions about rosters, absence or weather-related concerns.

For individual gigs, it is helpful when the app explains why a specific task is offered to a worker. Useful information includes the delivery location, the worker’s proximity to that location, the mode of transport used, and whether the worker is actually available, for example by not assigning new tasks before the current one is completed. This type of transparency can strengthen workers’ sense of autonomy by helping them decide whether to accept a task or reject it to avoid stress or danger. Where leaderboards are used to allocate tasks, for example

by offering work first to the highest-performing workers, the scoring rules should be clear in advance (*see Chapter 11*).

During a shift, delivery workers also benefit from timely information and support. Some form of dispatch function that can respond quickly to acute problems can improve workers' sense of safety. This may include support after an accident, information about roadworks, help when a rider cannot find an address, or assistance when workers encounter aggression. However, while better communication can improve transparency and safety, information should be tailored to workers' needs. Otherwise, there is a risk of a transparency paradox, which creates an information overload (*see Chapter 11*).

Technology for accident prevention

The Dutch contribution largely focuses on technological approaches to reducing safety risks. One example is accident detection using sensors or smartphones, with a reported accuracy rate of 92.5%, suggesting that this technology may be a viable safety tool. Its main benefit is that dispatchers could respond quickly to incidents and help prevent escalation. A second promising approach is the use of gamified training, where realistic scenarios and dilemmas can be simulated to support better decision-making in the field. Third, artificial intelligence may enable platforms to support workers more proactively, for example by helping them avoid congested or high-risk traffic areas, suggesting breaks, or providing additional information about clients (*see Chapter 12*).

A related but distinct solution is the development of software that operates alongside, or outside, official platform systems. This may include tools for group discussion, where workers can share experiences and safety-related knowledge. Dedicated worker-led platforms can also function in parallel with official platform software. One example is Turkopticon, which supports workers on Mechanical Turk, a virtual crowdsourcing marketplace, by enabling them to share information about unreliable clients, low pay and system failures. Such tools, often referred to as shadow software, may provide an important space for sharing safety lessons and collective learning (*see Chapter 12*).

Additional measures to support OSH

Additional measures to support OSH were mentioned across the chapters. One of them was to provide OSH training during platform enrolment, so that new workers can recognise relevant risks in the field. Regular equipment checks, the routine provision of personal protective equipment, such as helmets, and adequate maintenance would also directly improve safety. Platforms could further reduce overload and fatigue by limiting working hours. Weather forecasts would also help workers make safer decisions, particularly when poor weather conditions are expected.

Other solutions do not intervene directly in OSH, but help create the conditions for safer work. One example is the provision of work hubs: physical offices or meeting points where workers can start their shift, collect personal protective equipment (PPE) or equipment such as bicycles, and return between tasks. Such hubs can support the exchange of experiences, including safety-related lessons. A non-physical hub could also be useful, for example a dispatch function that supports workers during tasks, answers questions and handles complaints.

Beyond support provided by platforms or companies, workers can also organise themselves. This may involve forming unions or creating spaces for information exchange alongside the work platform. These initiatives can be formal, through dedicated platforms such as Turkopticon, or informal, through group chats and peer networks (*see Chapter 12*).

Safety learning for delivery workers

A central question in this work is how delivery workers learn about safety. Although the investigations differ in focus, there is also some overlap. The Finnish study interviewed individual delivery workers about their working conditions, while also capturing safety incidents and processes of safety learning. Engeström's (2001)[12] theory of learning was used to analyse how workers learn about health and safety. This theory is structured around four questions: who is learning, why they are learning, what they learn, and how they learn. For this work, the final question is most relevant: how do delivery workers learn about safety on the job? (*see Chapter 14*).

In chapter 14, the Finnish findings suggest that workers mainly learn through personal experience. After falling from a bicycle, they become more aware of traffic risks. After working in snowfall, they better understand the dangers of poor weather and the impact it has on their work. Delays at restaurants help them recognise how waiting times can increase stress. Similarly, when workers receive no meaningful response from dispatch, they begin to lose trust in the information it provides, including safety advice. Taken together, these findings show that delivery workers are largely left to learn about health and safety on their own. They are, in effect, unsupported on-the-job learners. This aligns with Taylor et al. (2023)[13], who identify isolation, reduced autonomy and fragmented OSH information as key risk factors for platform workers.

The Dutch investigation (*see Chapter 15*) involved closer contact with employers that use platforms for algorithmic management. These employers mainly identify technical solutions for improving information provision and exchange as ways to enhance safety and working conditions. Although the motivation for such solutions may be partly financial — for example, whether software is cheaper than human management — the objectives are not entirely different from those identified in the Finnish study. Where the Finnish findings show that workers need better information, the Dutch findings indicate that information provision is also receiving attention from platform owners. As this is comparative research conducted by OSH institutes in different countries, we cannot conclude that this represents a general pattern. However, the findings do suggest that tailored communication can support health and safety learning among individual workers subject to algorithmic management.

The Norwegian and Spanish studies further reinforce the importance of social and organisational support for safety learning. In Norway, safety learning was found to be constrained by the isolated nature of platform work, limited opportunities for worker participation, and weak channels for communication and collective learning (*see Chapter 16*). In Spain, the emphasis was placed on the role of training, awareness raising, and the development of a broader safety culture, particularly in relation to psychosocial risks, mobility safety, and the needs of vulnerable worker groups (*see Chapter 17)*. Together, these findings

[12] Engeström, Y. (2001). Expansive learning at work: Toward an activity-theoretical reconceptualization. Journal of Education and Work, 14(133-156).
[13] Taylor, K., Van Dijk, P., Newnam, S., & Sheppard, D. (2023). Physical and psychological hazards in the gig economy system: A systematic review. Safety Science, 166

suggest that effective safety learning requires not only access to information, but also opportunities for interaction, support and continuous reinforcement of safe working practices.

SUMMARY & SYNTHESIS

This summarising and concluding chapter brings together contributions from four European OSH institutes connected through the SAF€RA network: the Health and Work department of the Netherlands Organisation for Applied Scientific Research (TNO), the Finnish Institute of Occupational Health (FIOH), the Social Science department of the Norwegian University of Science and Technology (NTNU), and the Spanish Technology Platform on Industrial Safety (PESI). Each institute had prior expertise in researching health and safety in relation to digital platforms and algorithmic management. This collaboration focused these efforts on safety learning among riders working for food delivery platforms. In this section we draw some conclusions and formulate recommendations.

Businesses providing platform services for riders are prime examples of organisations that dispute their duty-of-care responsibilities for people who work for them or through them. This is especially problematic in the food delivery industry because riders are exposed to a dangerous work environment: road traffic. In terms of safety provisions, a labour contract should offer protection through the Framework Directive. This is a lively debate in every country that participated in this work, and the investigations show that new European laws are rapidly entering the playing field. While the Framework Directive has long been the cornerstone of occupational health and safety at work, it does little to protect platform workers when they are classified as self-employed. Without the legal protections embedded in a labour contract, riders are made responsible for their own safety, while platform companies avoid responsibility as employers towards people using their platforms for work. All countries collaborating in this project can point to legal cases that seek to force platforms to recognise people working for them as employees with associated rights. The Platform Work Directive is intended to support these workers in acquiring the same legal protections as people in a formal employment relationship. Thus, even without explicitly mentioning safety, the Platform Work Directive is instrumental in forcing platform organisations to recognise their role as labour providers and to ensure adequate safety analyses and precautions. In the background, the GDPR and the AI Act restrict unnecessary collection of personal data and certain forms of data processing, which protects riders' privacy but not necessarily their health and safety.

A wide range of risks and solutions were identified across the participating countries. The most important risks for riders can be categorised as relating to: a) traffic, b) psychosocial stress, c) high physical load, and d) extreme temperatures. What distinguishes the country investigations is not so much the outcomes of the research, but the frameworks from which the research was developed. Finland draws attention to psychosocial risks, where workers experience stress and attention depletion due to the high job demands of the piece-rate business model. The Netherlands focuses more on the traditional OSH issue of adequate work equipment, or the absence thereof. Norway, on the other hand, identifies an imbalance between the demands placed on workers and the resources available to them, affecting cognitive load and workers' sense of autonomy.

Despite the different safety research approaches used by the participating countries, they all point to one well-known risk-influencing factor as key: adequate communication about work-related information. An investigation into how riders learn about health and safety found that

they are mostly left to their own devices. With some notable exceptions, riders do not receive adequate safety instructions from platforms. They are not provided with, do not use, or simply lack channels for exchanging safety lessons among themselves. Nor is there evidence that they are particularly able to gather safety information independently. Personal experience seems to be the most common resource they rely on when it comes to safety: they learn about safety by having an accident.

In principle, the relevant directives, regulations and standards should force food delivery platforms to improve the quality of health and safety for riders. But even without such legal protections, some relatively simple solutions could greatly improve rider safety. The investigations in this work identified the following recommendations:

1. Businesses offering platform work should provide basic OSH information to riders, preferably also including some basic training. Ideally, this would become standard practice in the industry when riders enrol on a platform, helping them recognise relevant risks in the field.
2. Labour unions, perhaps in collaboration with businesses or OSH institutes, should prepare basic, generic safety instructions for riders on the proper use of personal protective equipment and on how to perform safety checks on it, such as high-visibility jackets, helmets and/or gloves. Platform businesses can do better by providing the full suite of required PPE, perhaps integrated into their uniforms.
3. OSH institutes, perhaps in collaboration with businesses or unions, could reach out to riders to instruct them on the proper use of work equipment and to perform safety checks, or request evidence that such checks have been carried out, even when the equipment is bring-your-own.
4. Platform businesses should set limits on working hours to prevent fatigue and be transparent about how these limits were determined.
5. Platform businesses should provide riders with short briefings before they start their shift, perhaps including the weather forecast, traffic conditions during the shift, and an indication of how busy the shift is likely to be.
6. Platform businesses should provide a dispatch function or another open communication channel to support riders on the job. The aim is to support riders who face acute problems or need help after an accident has occurred.
7. Platform businesses, or anyone else with a stake, should facilitate collegial communication channels and encourage the sharing of safety lessons. This could be done either through the platform software or alongside it.

Measures that do not primarily concern communication with or between riders include:

1. Platform businesses, or any other relevant organisation, could offer riders an accident insurance plan, even if only on a voluntary basis.
2. Riders should unionize.

This book set out to examine which factors influence occupational safety and health for platform workers and how these factors are shaped by legal, technical and learning instruments. Across the four participating countries, the findings show that no single intervention is sufficient. Safer and fairer platform work depends on the combined effect of effective regulation, transparent algorithmic management, adequate organisational support, and opportunities for workers to learn from both experience and one another. While platform work and algorithmic management

will continue to evolve, the central lesson remains clear: innovation should not come at the expense of worker safety, health and wellbeing. Instead, the future of platform work should be shaped by systems that are not only efficient and productive, but also fair, transparent, healthy and safe.

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