



Health, Safety, and Well-Being in Platform-Mediated Work – A Job Demands and Resources Perspective

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ABSTRACT

Platform-mediated work (PMW) is an emerging way of organizing work, potentially challenging a sustainable working life. Still, PMW is relatively underexplored within safety science research. This comparative study examines two radically different platforms – food delivery and ICT-related consulting – to identify features of platform-mediated work that have implications for health, safety, and well-being (HSW) and developing a sustainable working life. Based on the Job Demands-Resources perspective, 35 interviews and observations of three digital communities, we identify two factors influencing demands and resources in platform work. The study illustrates the variety in PMW and how personal and contextual factors can moderate adverse consequences. Strategies for aligning PMW to sustainability are proposed.

1. Introduction

Work is much more than an activity that provides income. It forms part of our identity and development, affects our health, and is key to the functioning of organizations and societies (Fostervold et al., 2018). Decent work is emphasized in the United Nations Sustainable Development Goals (SDGs), goal number eight, 'Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all' (UN, 2015). This is further elaborated in Target 8.8, where the protection of labor rights, and promotion of safe and secure working environments, including those in precarious employment, are underscored. Amidst the increasing acknowledgment of the link between health, safety, and well-being (HSW) and social sustainability (Eurofound, 2021; Osha, 2016b), a recent phenomenon is capturing the interest of scholars from various research fields. The International Labor Organization (ILO, 2021) refers to the platform economy as 'one of the most important new transformations in the world of work.'

Platform-mediated work (PMW) refers to work where a digital platform matches client demand and supply of labor in exchange for payment (Eurofound, 2019a). PMW ranges from low-skilled online work (e.g., tagging images and answering surveys) lasting from a few minutes to a few hours to professional services requiring expertise performed from a few days to a few years (e.g., software developer and licensed

therapist) (Schmidt, 2017). Digital labor platforms such as Uber, TaskRabbit, and Amazon Mechanical Turk are refashioning work into one-off tasks and recasting the binary employer-employee relationship into triangular (Cherry and Aloisi, 2016) or multi-sided (Nielsen et al., 2022) relationships between the worker as an independent contractor, the platform company, and the customer/third parties. Estimates of the number of workers engaged in PMW vary due to different methods, definitions, and non-disclosure from platform companies (ILO, 2021). PMW is a small but growing part of the EU labor force that is expected to reach 43 million in the next three years from the 28.3 million estimate in 2022 (European Council, 2022).

Previous studies have identified several benefits of PMW, including the reduction of undeclared work, additional income, flexibility (Hall and Krueger, 2018), and an opportunity to pursue entrepreneurial activities (Ahsan, 2020; Garben, 2017). Downsides causing concern include click-through agreements liberating platforms from employer responsibilities (Aloisi, 2015), algorithmic control features intensifying work (Rosenblat and Stark, 2016; Griesbach et al., 2019), isolation (Ashford et al., 2018), and the general lack of safety nets (Stewart and Stanford, 2017). Various health and safety issues in PMW have been identified, including (1) health and safety risks related to the nature of PMW (e.g., online work or on-location work), (2) temporary work relationships and associated risks due to low job security, income unpredictability, lack of training, and experience, and (3) platform-related

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risks such as performance pressures through control mechanisms inscribed in the digital technology (Bajwa et al., 2018).

A majority of the previous studies have considered low-skilled PMW concerning working conditions (Griesbach et al., 2019; Rosenblat and Stark, 2016; Shapiro, 2018), possibly resulting in biased results that are attributed to PMW in general. There are considerably fewer studies regarding professional services requiring expertise in this respect (Røtnes et al., 2019; Jarrahi et al., 2020). Further, there is an apparent lack of studies comparing different forms of PMW (Schor et al., 2020), especially between high-skilled and low-skilled work types. In addressing this knowledge gap, we argue that a comparative perspective will provide nuanced insights into factors and dimensions that influence working conditions in PMW. Examining contrasting patterns stimulate theory development and provide an opportunity to study ‘relationships that may not be studied in other ways’ (Mills et al., 2010: 2).

This study provides qualitative insights into working conditions for (1) food delivery couriers and (2) ICT consultants. ICT consulting is a high-skilled type of work requiring an extended period to complete, while food delivery can be considered a low-skilled task that can be performed in under an hour.

Although work features like job security, autonomy, and cognitive load have been identified as essential aspects of PMW impacting HSW (Ropponen et al., 2019; Watson et al., 2021), these remain general work characteristics found in work that is not mediated by a platform. Distinguishing features of PMW will therefore consist of common factors found across various types of platform work. To achieve this, we apply the Job Demands-Resources (JD-R) theory to compare the two types of platform work.

JD-R theory posits that work features (physical, psychological, social, or organizational), categorized into job demands and resources, have implications for employee well-being and organizational outcomes (Demerouti et al., 2001). Unlike its predecessors - the demand-control model (Theorell et al., 1990) and effort-reward imbalance model (Siegrist, 1996) - that only account for the work dimension, JD-R theory includes the employment and social relations dimensions (Kilhoffer et al., 2019: 52). In addition, it provides a flexible framework in that all work characteristics can be categorized as job demands and resources (Bakker et al., 2014). We will explore the following by focusing on two research questions:

1. How can the working conditions be described in different forms of PMW in light of the JD-R perspective?
2. What common factors can be identified influencing the working conditions in different forms of PMW?

Although the JD-R theory has been applied to PMW, empirical studies remain wanting, specifically in identifying common factors in PMW that influence job demands and resources. Moreover, the platform economy’s impact on HSW remains underexplored within safety science (Christie and Ward, 2019). Keith et al. (2020) underscored individual contingencies influencing HSW outcomes. More importantly, studies applying JD-R have looked primarily at work where organizational boundaries are still distinguishable. In recent decades, business models reducing the organization to its core activities and competencies through outsourcing and contractual hiring have contributed to the rise of non-standard work arrangements (Quinlan, 2015). PMW is the pinnacle of Weil’s fissured workplace (Weil, 2019), where labor and capital reorganization delimits the number of workers within the organization’s confines and responsibilities (Collier et al., 2017). The dissolving boundaries of the organization and individualization of work will have consequences on health, safety, and well-being (Nilsen et al., 2022), but possibly to varying degrees. Recognizing these developments, we contend that *personal* and *contextual* contingencies become all the more important in considering their role in HSW.

We will contribute to the existing PMW literature and JD-R theory by (1) applying JD-R theory in comparing the demands and resources of two distinct types of work (ICT and delivery); (2) identifying common factors to different forms of PMW that influence job demands and

resources, and their HSW outcomes; and (3) examining both personal and contextual contingencies to explore their roles in determining HSW outcomes;

The succeeding section provides the theoretical framework of this study, followed by our analysis of the interview and observation results. Next, a discussion on the demands and resources in different platform work contexts is presented. Finally, we underscore how the proposed model facilitates a better understanding of HSW in platform-mediated work and potential strategies for creating sustainable work in the platform economy.

1.1. The job demands-resources perspective

According to the JD-R theory, demands are job features requiring continued efforts linked with inherent costs that can result in adverse health consequences (Demerouti et al., 2001). In contrast, job resources are aspects of the job that reduce demands and contribute to personal achievement, engagement, learning, and development (Bakker and Demerouti, 2017).

Since its introduction, several studies have been published supporting the dual pathways predicting employee well-being and organizational outcomes, including physical and psychosocial workplace safety (Yaris et al., 2020). While job resources relate positively to engagement and motivate safe working practices, demands such as risky or complex work are positively associated with negative health consequences and poor safety performance (Nahrgang et al., 2011). In a meta-analytic review of longitudinal studies applying the JD-R model, Lesener et al. (2019) extracted three key assumptions inherent in the perspective: 1) job demands are the most important predictors of health-related outcomes, 2) job resources are key predictors in motivational outcomes, and 3) job resources play a role in the link between job demands and adverse health outcomes.

1.1.1. Personal and contextual contingencies

Studies have also explored the role of personal resources (Bakker and de Vries, 2021) in explaining individual differences in negative health outcomes and work engagement despite similar working environments (Bakker and Demerouti, 2014). Personal resources such as job crafting – where workers actively shape their jobs – highlight the active role of individuals (Boehnlein and Baum, 2022) in contributing to work engagement and job satisfaction (Bakker and Demerouti, 2014).

Some studies in JD-R have started looking at contextual contingencies: (1) in the public sector moderating individual, performance, and organizational outcomes (Fletcher et al., 2020); (2) state support in determining work-family conflict (Annink et al., 2016); and (3) the moderating influence of national culture on burnout/work engagement (Rattrie et al., 2020).

1.1.2. Platform-mediated work through the JD-R lens

A few studies have applied the JD-R theory in the study of PMW. Keith et al. (2020) found that personal adaptation factors (e.g., human capital, tolerance for ambiguity) and individual contingencies serve as push and pull factors (financial status, family needs, preferences) that influence worker participation in PMW. Also, Ropponen et al. (2019) applied the JD-R approach in describing work characteristics and the potential impact on HSW outcomes of platform-mediated work. They identified job insecurity, isolation, physical work environment, competition, and cognitive load as likely demands in PMW. Further, they identified work variety and potential for developing skills as characteristics of PMW that have positive outcomes for health and safety (Ropponen et al., 2019). Watson et al. (2021) identified alienation, emotional labor, and underemployment as job demands while autonomy, workplace social support, and task identity as resources in their literature review of a broader concept of gig work, which includes PMW, agency work, and other types of contingent work.

Applying a Job Demands and Resources (JD-R) perspective in our

study allows us to compare two distinct digital platforms. In analyzing our empirical data, we describe how the organization's external environment (*contextual contingencies*) and the individual worker's resources (*personal contingencies*) affect the HSW outcomes of PMW. By comparing polar opposites, we can identify common features that influence job demands and resources in PMW.

In the following, we will apply the JD-R perspective as a lens in reviewing studies of PMW and identify possible demands, resources, and outcomes in this type of work.

1.1.3. Demands

1.1.3.1. Physical risks. Removing or reducing physical risks is a focus area within occupational health and safety (Eurofound, 2021). The physical environment, or the workplace, includes 'physical hazards and physical conditions under which work is performed' (Eurofound, 2021: 10). Most of the workers engaged in PMW perform their work on the road, at other people's premises, or their home office in the case of online platform work. The physical risks involved depend on the task performed and are similar to equivalent jobs outside PMW (Bajwa et al., 2018). However, Tran and Sokas (2017: 64) add that 'health and safety risks could be anticipated to be worse in gig work because of the loss of the protective effect of working in a public workplace.' In delivery work, potential risks include ergonomic risks associated with operating a vehicle or handling parcels, risks from road and weather conditions, and challenges related to interaction with clients (Gillis et al., 2022). Prolonged hours of sedentary work performing desk-based tasks may result in health issues such as musculoskeletal disorders, visual fatigue, and other ergonomic problems (Lenaerts et al., 2021: 17).

1.1.3.2. Performance pressures. PMW may involve performance demands such as emotional labor, high work intensity (working at high speed or towards tight deadlines), and extensity (long work days or weekly hours) (Eurofound, 2021). Low pay per task (Kilhoffer et al., 2019) and competition between workers (Lane, 2020: 12) encourage long hours and risk-taking behaviors. Emotional labor or client-pleasing behavior is influenced by rating systems that reward what is deemed by the platform as proper behavior and keep their accounts from being deactivated (Gandini, 2018). The risks related to performance pressures may be higher for PMW than traditional counterparts due to the combined effects of working conditions (job insecurity, irregular and extended working hours, work intensity), task allocation, and evaluation systems (Lenaerts et al., 2021: 15).

1.1.3.3. Cognitive load. Cognitive load has been identified as a demand due to the need to filter through large amounts of information made available by digital technology in different formats and various sources (Ropponen et al., 2019). PMW also demands significant unpaid work, waiting for or finding relevant tasks (Choudary, 2018). The cognitive demands tied to unpaid work include sifting through appropriate tasks, taking qualification tests, reading requester reviews, ensuring correct payment calculations, and administrative work as an independent contractor (Berg, 2015). In addition to information overload leading to feelings of incapability to meet demands, financial stress is also evident among gig workers whose decisions result in economic gains or losses (Bérastégui, 2021).

1.1.3.4. Material demands. The organization typically provides its employees with the tools and equipment to perform labor in standard work arrangements. Part of the organization's hazard prevention and control is to ensure the proper functioning of equipment and prevent incidents/accidents resulting from its failure through equipment maintenance (Osha, 2016a). In PMW, however, individual workers are required by the platforms to provide the means of production to underscore their responsibility as independent contractors (Schmidt, 2017). The lack of

maintenance to reduce service costs and the use of substandard tools and equipment may result in accidents.

1.1.4. Resources

1.1.4.1. Autonomy. According to Kuhn and Maleki (2017: 187), 'all platform workers have some autonomy in terms of controlling their scheduling.' However, worker autonomy varies across platforms and is shaped by the company's operational decisions (e.g., performance evaluation, incentives, and determination of pay) and the worker's dependence on the digital labor platform (Kuhn and Maleki, 2017). Penalties associated with declining too many orders, failure to log on at particular times or within certain work zones, or canceling scheduled shifts are restrictions established by the platform which limit autonomy in PMW (Griesbach et al., 2019: 11). Incentive pay systems (Wu et al., 2019), customer ratings, and ranking systems are soft control mechanisms that counter the autonomy and flexibility platforms advertise to workers (Shapiro, 2018).

1.1.4.2. Social support. Supervisors and co-workers generally serve as social support by providing help, feedback, or recognition of exemplary performance (Eurofound, 2019b). Even temporary social relations can buffer work demands and foster feelings of belonging (Ashford et al., 2018). Internal ranking mechanisms that pit workers against each other and the lack of face-to-face interaction inhibit the formation of support from colleagues and reduce opportunities to consult others about work-related issues (Tran and Sokas, 2017: 64). Collaboration and communication, whether online or in-person, enable workers to bring important issues to the forefront (Bergvall-Kåreborn and Howcroft, 2014). Leaders or supervisors can also indirectly contribute to positive work attitudes and improve performance by providing workers with job resources in the form of feedback, involving workers in decision-making, recognizing worker efforts, and establishing good relationships with workers (Bakker and Demerouti, 2018). Not only have supervisor relations been replaced by the digital platform, but some platforms have also been known to have poor dispute resolution policies (Berg, 2015). Social support in PMW is low due to the lack of social opportunities as work is performed in isolation, with high turnover and geographical dispersion (Kilhoffer et al., 2019: 88). According to Duggan et al. (2020: 122), PMW is a 'heavily transactional relationship' where the development of mutual trust is absent, no long-term relationship is expected, and reducing labor turnover is not of concern.

1.1.4.3. Professional development. Platforms lack the infrastructure to train workers and provide professional development (Ashford et al., 2018). Instead of providing training and opportunities for skill development, deskilling (Gandini, 2018) takes place through a highly controlled labor process. Schor (2017) points out that many highly-educated workers perform platform work for additional income. By doing so, the overqualified workers may crowd out those who usually perform such work (Schor, 2017). Some see PMW as a way for companies to transfer risks to individuals and communities while maintaining control over labor and maintaining 'zero-liability' (van Doorn, 2017: 901). For on-location work, training is reduced to instructions on how to use the app, in some cases, traffic safety. At the same time, online workers usually develop their skills by utilizing online resources (Eurofound, 2018). As Todolf-Signes (2017: 196) puts it: 'companies have no incentive to provide training to workers because if anyone wants to do a job they need to be sufficiently trained and ready to work.'

1.2. HSW outcomes and work sustainability

The business choices and resulting architecture of digital labor platforms have implications for worker well-being (Choudary, 2018). While platforms empower workers through data transparency,

capability enhancement (e.g., GPS route optimization), and voice, extreme standardization, frequent policy changes, and algorithmic management can lead to worker exploitation (Choudary, 2018). Employment, working conditions, and HSW outcomes are interlinked and have direct and indirect economic consequences at various levels (Jain et al., 2018). The economic costs resulting from an organization's externalization of its responsibilities are paid by other stakeholders like the individual worker and society (Dorman, 2000). If organizations are to work towards sustainable development, the externalization of responsibilities needs to be addressed.

As more and more individuals find themselves outside standard employment and social safety nets, the more immediate it becomes for the state to fill in this void through other ways of social protection (ILO, 2022). Since well-being is crucial to productivity and the promotion of sustainability, an integrated and interdisciplinary approach is needed to address the negative impacts of PMW and non-standard working arrangements in general (Jain et al., 2018). This also implies that aside from adequate enforcement of state policies and regulations, voluntary standards and an acknowledgment of HSW as a basic human right are necessary (Jain et al., 2018: 222).

2. Study design

A qualitative research strategy allows for in-depth exploration and the opportunity to 'see through the eyes of the people being studied' as they make sense of their environment (Bryman, 2016: 132). A semi-structured interview with open-ended questions and online community observations were used in the study to enable workers to discuss issues they deem essential in describing their experiences and challenges.

2.1. Data collection

We performed 35 interviews involving workers from the ICT and delivery platforms. The interviews were conducted between February and September 2020. Interview data included 26 food delivery workers, six ICT consultants, and three management representatives (one in ICT and two in delivery) (see Fig. 1). The interviews focused on worker experiences in PMW, including their motivation for joining, the app features, the work process, relations with the company and other workers on the platform, working conditions, and health and safety challenges.

Several strategies were used in recruiting participants for the study. For the ICT consultants, the founders of the platform were contacted personally. One of the founders consulted the members to ensure consensus on the planned observations and informed them of participating in the study through interviews. Volunteers contacted the researchers, and interviews were conducted online according to the

participants' scheduling preferences. For the couriers, initial contact was achieved through social media (LinkedIn and Facebook), face-to-face intercepts near restaurants, availing of the platform's food delivery services, and snowballing (Biernacki & Waldorf, 1981). The participants gave explicit consent before the interview audio recording, which lasted between 45 and 75 min. The audio files were subsequently converted into transcripts. Workers from both platforms were encouraged to participate in the interview with a gift card (approximately 28 Euros/300 NOK). The number of participants was determined by several factors – 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 (Tjora, 2019).

Observation of three online communities (WhatsApp and Slack for couriers and Slack for ICT consultants) was also undertaken to capture informal interactions among the platform workers. Online observations add depth to the study and improve validity through methodological triangulation (Yin, 2010). Likewise, it presents an opportunity to understand issues relevant to the community members (also those not interviewed). For instance, interviews pointed to occasional near-misses, while the online observations revealed the occurrence of traffic accidents and sustained injuries. Furthermore, issues such as interaction with customers (positive and negative), challenges of delivery during the pandemic, and courier reactions to the performance evaluation introduction and management communication were observable online. The observation was performed from February to April 2020, while the observation occurred from June to August 2020 for the food delivery community. Thick descriptions of observed member interaction were supplemented by screenshots of online content (with consent). Ethical approval for the study was given by the Norwegian Centre for Research Data (NSD), and all guidelines were followed (informed consent, possibility to withdraw from the study, data protection, etc.).

Table 1 provides an overview of the two types of PMW. The small number of ICT consultants is justified by the vetting process consultants undergo before becoming a platform member. The selection of consultant members includes an evaluation of their motivations, work experience, and professional skills. The vetting process is a homogenizing factor that ensures that interviewees represent the members in general. A high degree of data saturation was therefore achieved after six interviews. The small number of female interviewees reflects the preponderance of male participants in these two platforms.

2.2. Data analysis

A computer-assisted qualitative data analysis software (NVivo version 1.6.2) was used in the data analysis. Template analysis was performed to identify job demands, resources, and patterns relevant to

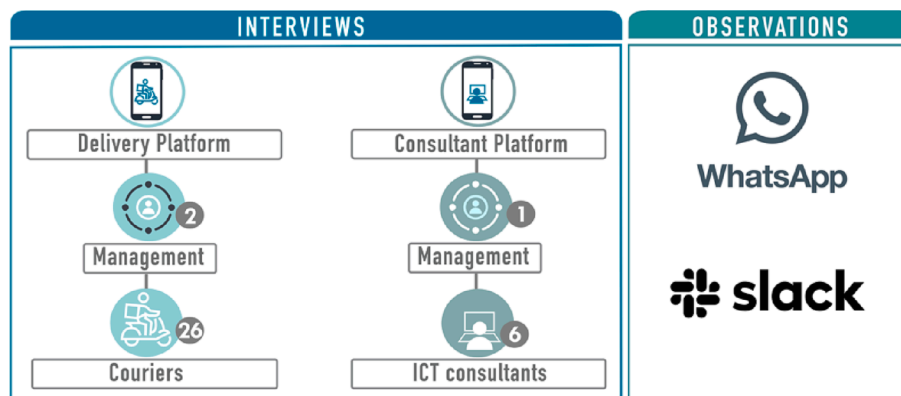


Fig. 1. Empirical data based on interviews with workers and managers of two digital platforms mediating work and online community observations.

Table 1
Overview of workers in the delivery and ICT platforms.

Platform	Total	Male	≤35 years	Main income	Student	Employee	Migrant worker	≥High school	≥ 20 hours
Courier	26	24	18	10	15	18	14	19	13
Consultant	6	5	0	5	0	1	0	6	5

health, safety, and well-being in PMW. Template analysis is flexible and enables the comparison of perspectives between distinct groups within a specific context (Cassell and Symon, 2004). The template (list of codes) developed included an initial list of codes based on JD-R literature (e.g., job crafting, social support from colleagues or management) and interview questions. Codes were then modified, themes identified in the interviews were added, and a final template (Cassell and Symon, 2004) was created (Fig. 2) containing broader categories to compare the two distinct types of PMW. The results from the template analysis were then consolidated with the results from the community observations. The coding was performed by the first author and validated by the second author.

Since job demands and resources are occupation-specific (Bakker and Demerouti, 2014), and we are comparing two distinct types of work (ICT consulting and delivery), the specific demands and resources were grouped into more comparable categories (see Fig. 2). Contingencies, or the differences between individuals and the external environment, were also categorized to identify their link to HSW outcomes.

3. Results

This section presents the analysis of our empirical data. The data were grouped into demands (physical risks, performance demands, cognitive load, and material demands) and resources (autonomy, social support, and professional development).

The food delivery platform engages primarily young male workers with diverse educational backgrounds and job experiences in low-skilled courier work. The couriers can choose employment or freelancing. The delivery platform entices potential workers by advertising flexible work hours and providing a choice of working arrangement – ‘Be your own boss’ or work part-time. Opting for a part-time job classifies the worker as an employee with guaranteed pay for minimum working hours (10 h) and additional pay per delivery. The platform management and employee representatives have signed a collective bargaining agreement (CBA). The CBA includes their hourly rate, seniority, delivery rate,

winter compensation, holiday pay, overtime, equipment maintenance, and insurance. The platform later introduced contracts for freelancers. Freelancers have no minimum work hours, receive a piece rate without compensation for an orderless shift, and fall outside the company’s safety management system. Also, the platform allows for changing contract types from employee to freelancer and vice versa.

The ICT platform resembles a cooperative of highly skilled and predominantly male independent consultants with several years of ICT experience and diverse expertise. The founders established the platform in protest of high broker fees in the consulting industry. Market intermediaries take 7%–30% of the consultant’s hourly rate and set quarantine periods that prevent additional assignments from the same client. The members include highly skilled software developers, product designers, system architects, technical writers, and project leaders. The platform receives 3% of the contract sum, which is used for further platform development, incentive pay for members who acquire projects for the community, and profit for members who choose to be co-owners of the platform.

3.1. Work aspects of PMW

3.1.1. Demands

3.1.1.1. Physical risks. Cycling couriers agree that the work is physically demanding. An immigrant courier (Delivery employee 10, primary income) added, ‘You must be mad to cycle for [platform] in the winter or desperate perhaps.’ Informants also identified other issues, such as getting foreign objects in the eyes while cycling, exposure to air pollution, weather conditions, potential knee injuries from strenuous uphill cycling, and possible back injuries from unsuitable backpacks for carrying heavy grocery items. The potential distance between deliveries and restaurants has also increased due to the expansion of the delivery areas. Although some point out the health benefits of the job, some find the work challenging:

Category	Description
Demands	
Physical risks	= Ambient risks/ physical working environment, posture-related risks
Performance demands	= Work intensity (speed, deadlines), extensity (work hours, periods), client relations
Cognitive load	= Complex problem-solving and knowledge application
Material demands	= Required tools and equipment by the platform
Resources	
Autonomy	= Control over how task is performed, control over working hours
Social support	= Collegial interaction, sense of belonging, supervisor feedback/communication
Professional development	= Opportunity for career progression, skill development, training
Contingencies	
Personal contingencies	= Motivation for PMW, adaptive capacity (e.g., job crafting), employability (e.g., competence)
Contextual contingencies	= Conditions external to the platform (e.g., national regulations, work traditions, labor 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

Fig. 2. Final template showing the four main themes.

I wouldn't recommend it for a permanent job or employment. It is a very physical job. You cannot work 8 h a day. You will be tired, pain... (Delivery employee 11, student).

ICT consultants prefer to work on client premises for practical and social reasons. This means they have a public workplace covered by workplace regulations (Tran and Sokas, 2017). Although the consultants have no direct influence on their clients' physical work environment, they have the luxury of selecting clients and projects.

3.1.1.2. Performance demands. Couriers receive performance statistics through email and are encouraged to 'dominate the KPIs.' The interviews revealed that beginners felt pressured to work faster. Seasoned couriers, however, have learned to pace themselves, pointing to an adaptive capacity (Keith et al., 2020) that couriers gain through experience. Most of the informants have not experienced dealing with demanding customers. They are usually happy to receive their meal. This finding contrasts with the laborious task of client-pleasing behavior observed by Gandini (2018).

The delivery platform later introduced performance-based staffing (PBS), which tied internal ranking with the time they can schedule working hours ahead of time. Upcoming shifts were made available for the best performers first, which posed a risk to individuals in the lowest ranks getting a quiet shift or no shift at all. Even before the PBS introduction, platform-dependent workers felt pressured to grab shifts before they disappeared. Some couriers expressed that they deem the PBS unfair since part of the evaluation includes factors they have no control over, such as delays from the restaurant or being given long-distance orders using a bike that should have been given to a car. An employee 'almost had a nervous breakdown' after hearing about the introduction of the PBS, according to a fellow courier (Delivery employee 17, primary income). Informants noted the various changes that occurred over a short period in terms of app functions, freelancer bonus systems, and the inclusion of grocery item deliveries.

Similar to the high-performance demands of delivery work, ICT consultants can also work long, intense hours, especially close to deadlines. Unlike the delivery platform, performance demands come from clients and are also an inherent part of being independent contractors where future contracts depend greatly on good performance and reputation. Aside from project-related work, additional hours go to managing their enterprise. Client-pleasing behavior still appears to be moderate since informants underscore their ability to choose their projects and the option to leave recalcitrant clients.

3.1.1.3. Cognitive load. Couriers reported low cognitive demands as their work requires them to 'follow the app.' (Delivery employees 8,16). 'The app tells you everything you need to do. You almost don't need to think,' one employee (Delivery employee 1, student) notes. Others point out that the simple delivery task allows them to listen to podcasts or think. Platform management also described delivery work as 'rinse and repeat.' Changes in the system somewhat increased their cognitive load as they spent more time checking that they received the additional pay for longer distances stipulated in the CBA and that the PBS introduction did not affect their number of deliveries per hour. The changes also introduced occasional bugs in the system, which resulted in workers spending time consulting with others in the community or documenting problems with the AI allocating long-distance deliveries to bikers instead of car drivers.

Cognitive load is high among ICT professionals awarded contracts to use their competence in providing specific solutions to their clients. A lot of work goes into building networks and managing their company. Since ICT is constantly developing, the consultants underscore the importance of keeping up with changes. Skill development is achieved through attending courses or meticulously selecting projects that enable acquiring new skills.

As a consultant, you do not work with the same solutions or technical platforms; it is important to have a wide range of experience. [...] If one has worked with old systems too long, it would be difficult to find another job. (ICT Consultant 5).

3.1.1.4. Material demands. The platform requires delivery workers to provide and maintain the tools and equipment. The arrangement seemed welcomed by cycling enthusiasts. An employee remarked, 'You can identify who is a bike enthusiast by their bikes. Enthusiasts appreciate a good bike and spend considerable money on good equipment.' However, online observations revealed workers are exposed to the risk of bike theft during delivery. One reported having four of his bikes stolen in three years. Another employee stated his dissatisfaction regarding the finances:

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, primary income).

Most ICT consultants have established their own Limited Company, which requires payment of share capital and other expenses related to managing the business enterprise. Although investment is significant and some risks are involved, many revealed earning almost double the amount they would make as an employee. Another benefit of establishing a limited company is that they can hire themselves as their company's employee and secure the same rights and benefits as employees. However, they are given only a month's notice from the client in the case of contract termination.

3.1.2. Resources

3.1.2.1. Autonomy. For delivery workers, the app's stepwise instructions leave little room for experimentation, thus reducing opportunities for exercising autonomy. Delivery employees set unavailable times and automatically get shifts based on contract hours through the app. Freelancers can only grab weekly published time slots or check for shifts appearing sporadically. Employees can also 'grab' time slots for additional hours. Freelancers can reject requests and receive more information than employees, although several rejections may result in a frozen account for 15 min during their shift. Employees must accept all received orders despite not seeing the area and distance until after receiving the food. Since the food delivery platform governs the entire work process, the main link to the company is the app. Although some were positive about working solo and not having a boss 'on your back,' more outgoing individuals long for social interaction. Through their shop stewards, the employees have requested a wider log-in zone for delivery to have higher flexibility in starting their shift. Employee discussions with management through their safety representatives or shop stewards have resulted in a few app feature changes (e.g., adding seniority points, freelancer rejections, and excluding deliveries per hour in the ranking calculation), indicating a modest ability to influence the work process. However, countries worldwide use the same app, which may result in local considerations being shelved or deemed unsuitable globally.

Unlike the algorithmically determined task allocation in the delivery platform, the ICT platform does not allocate the available tasks. The consultants can access available projects published on the platform at any time. The projects vary in description length, from a few sentences and links to an external site to projects with detailed descriptions and several attached files. Consultants can click on 'I am interested' to contact the company posting the project and, at the same time, agree to the platform payment (3%). They are free to directly communicate with the prospective client and determine their professional fee.

The individual consultant determines the hourly rate. In cases where we think the price should be different, we only provide advice to ensure they do not price too low or too high. (ICT Consultant-Founder).

The platform provides additional income to consultants who are newly established or in-between contracts through publishing tasks for improving the platform itself. Qualified members can claim the task, perform work, and get paid by the platform.

3.1.2.2. Social support. The interaction between the delivery workers is limited. In the city where the platform headquarters is located, there is an equipment room where couriers briefly bump into fellow employees. The platform sponsors a language café and a bike maintenance workshop for employees in their headquarters. In other cities, however, couriers do not have a similar meeting place, although employees in the various cities can join an occasional social gathering sponsored by the company. Freelancers are decoupled from the rest of the organization through individualized contracts combined with insufficient infrastructure to communicate with other couriers. The app itself does not provide a channel for workers to connect. The informal online community exists *outside* the platform organization and is an essential arena for discussions.

Some employees point to poor management communications. The interaction between the management and the delivery employees, albeit limited, is ensured by national regulations requiring formalized avenues for employee participation. However, employees with union membership had noticed an improvement in the almost non-existent communication with management before the CBA was in place, pointing out the importance of worker representation and voice through unionization.

The communication with management improved after we agreed to the collective bargaining agreement. Getting the CBA is a crucial step to improving working conditions further. (Delivery employee 14, primary income).

For the ICT consultants, the platform provides a way for otherwise isolated professionals to voluntarily connect with fellow consultants to a degree they see fit. In contrast to the ease of access to the platform in courier work, aspiring members undergo a vetting process to ensure competence and maintain the platform's reputation. Although membership does not have an expiry date, divergence from social and professional norms may result in exclusion from further access to the platform. While some are very active on Slack and attend social gatherings, others prefer to be in the background. The link to the platform through community membership is encouraged and forms the basis of the platform's business model.

Through their number, the consultants acquire discounts and reduce costs by ordering products and services in bulk. ICT consultants claim that although each project eventually concludes and they move on to the next, the social relations within the platform community remain stable. Although some have not acquired contracts through the consultant platform, they intend to remain members precisely due to this sense of community.

There is much alone time as a consultant. You cannot mingle so much with the clients because you know that it will end one day. But [consultant platform] is a stable link – the members are the same, everyone has questions or is in the same situation. (ICT Consultant 2).

3.1.2.3. Professional development. For couriers, traffic safety is just a minute part of the 2–3 h 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). Besides the opportunity to become a team leader, shop steward, or employee safety representative, the organization is relatively flat, with a small core management and logistics group.

The ICT consultants use extended breaks between projects to enhance their competence through taking courses. Some members have provided courses like web development which the platform has sponsored.

3.1.2.4. Personal and contextual contingencies. Delivery workers vary in their motivation for joining the platform. While some couriers engage in PMW as their main source of income, others do platform work to top up their earnings. Couriers who do not speak the national language revealed they joined the platform due to a lack of other alternatives. An immigrant employee emphasized the difference between 'cyclists' who genuinely enjoy cycling and so-called 'riders' who only engage in food delivery for money.

Interestingly, young couriers consider the evaluation a personal challenge and even use an additional app (Strava) to compete for fun. Another (Delivery employee 7, student) adds, 'I do feel like if there is a push to go faster, then it comes from me.' Personal delivery targets also influence work intensity in food delivery, especially for freelancers receiving payment per delivery. Hence, work intensity is both system-induced and self-induced.

The interviews revealed forms of job crafting to increase earning opportunities, such as selecting strategic waiting areas or how to get the best shifts (e.g., grabbing the high-demand shift first before others grab them). Many freelancers look at the delivery area and reject long distances and uphill deliveries. Others have developed rules for when and where (e.g., distance from the restaurant or customer) to click confirmation of a step in the delivery process to access additional information or get new deliveries. One courier believed that artificial intelligence (AI) could be influenced by strengthening the link to a specific restaurant by waiting near the same restaurant after every delivery. A freelancer also mentioned the possibility of a car driver teaming up with a biker to increase delivery numbers. An employee also confessed to faking a bike breakdown or pretending to feel ill to avoid certain deliveries.

Several international students expressed gratitude for the income opportunity they otherwise could not have gotten elsewhere due to a lack of language proficiency. The student-couriers planned on getting work related to their education and regarded PMW as temporary. Hence, changes that potentially impact them negatively seem tolerable. A student from another European country added that the high demand for delivery services in the country makes access to orders unproblematic despite the PBS introduction. However, some main-income earners, especially car drivers with a migrant background, have indicated engaging in long work hours to make ends meet or support their family members. When asked to assess the working conditions of PMW in the country, couriers are unanimous in saying that the country generally has good working conditions and a well-functioning welfare system. The platform management recognizes the strong union traditions in the country. Union members appreciated the strength of labor unions and their contribution to improved working conditions.

The consultants do not feel dependent on the consultant platform. Many used several brokers to ensure future projects. Additionally, they do not see the need for collective representation through unions since they get similar benefits from joining the cooperative platform. Moreover, they do not perceive outsourcing of ICT-related work to countries with lower hourly rates as a critical issue. Outsourcing tasks may present language and cultural issues that can lead to miscommunication or incorrect assignment execution. Companies seem to value the shared language and culture and are interested in acquiring the services of skilled local professionals who accomplish tasks correctly the first time. The informants have sufficient opportunities to get future projects and underscore that there is room for educating more IT professionals in the country.

I do not think the global market will affect consultants here [...] because local knowledge is important. The main challenge with outsourcing to

other countries is communication. You have to sit together to work with people unless the task is minimal. (ICT Consultant 1).

3.2. Outcomes – HSW issues and experience of PMW

Although no fatalities have occurred, the study revealed road and traffic conditions resulting in scratches, bruises, and broken ribs for couriers. Both interviews and observations reveal workers taking shortcuts (e.g., beating red lights), disregarding helmet use (particularly freelancers), and skipping bike maintenance to save costs. Particularly concerning is the tendency for young couriers, notwithstanding contract type, to seem to rely on their ability to cycle and regard safety as an individual responsibility.

I do tend to take a risk. Shortcuts – why not? So all the shortcuts and the risks I take, I take them. It is on me. I am the one responsible for that. (Delivery employee 11, student)

[...] I crashed into another cyclist. I was distracted, and no one got hurt. I suppose his bike was a little bit damaged. I am careful, but I may not be as conscious about safety as I should be. I'm very confident in my ability to cycle. (Delivery employee 3, student)

Regarding their experience with working conditions, couriers express varying degrees of satisfaction. This satisfaction seems to be an outcome of a combination of factors, including motivation for engaging in PMW. Those who find themselves with no alternative are less positive in describing their experience and see their engagement in courier work as temporary or tolerable until something better comes their way. PMW offers students a great deal of flexibility where their free time can be used for work and focus on their primary goal, which is to finish their studies and find a suitable job. Most satisfied with this type of work are those who enjoy outdoor activities, especially cycling. The company's inadequate information exchange and the continuous changes implemented by the international headquarters – some seemingly unknown to the management – have resulted in increased mistrust and dissatisfaction among the couriers.

[...] 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, primary income).

ICT consultants face different potential outcomes regarding HSW, where desk-based work comes with risks related to irregular long hours of sedentary work (Lenaerts et al., 2021: 17). An overworked consultant disclosed needing a two-month hiatus to focus on health.

Many consultants notice that when you first have a well-paid project that is also very interesting, it is difficult to work less. (ICT Consultant 6).

The ICT consultants tend to work extensively. The interviews and observations indicate that few have given any attention to developing a personal health and safety management system as a limited company.

Except for one consultant who preferred job security tied to employment, most ICT consultants expressed high satisfaction with working as independent contractors. Further, they indicated that they would continue to do so even if presented with an equally high-paying, stable job. They were unanimous in being a member and plan on continuing to be engaged in the platform community.

4. Discussion

4.1. Describing the working conditions in different forms of PMW in light of JD-R

This study demonstrated how working conditions in two types of work could be compared by applying a broader JD-R perspective. Using template analysis to identify and categorize the demands and resources, we could describe and compare two distinct forms of PMW. Using the

JD-R lens, we can expect adverse HSW outcomes to arise from high job demands and insufficient resources. Having adequate resources, however, enable workers to meet high job demands. Fig. 3 provides an overview of the results related to our first research question.

For couriers, this study supports the existing literature on control features in platform work and their impact on increased work intensity and working conditions (Griesbach et al., 2019). Algorithms determine task distribution and service standardization through information control and performance monitoring (Rosenblat and Stark, 2016). App features such as remote log-in and performance ratings have done away with reporting to work and direct management supervision (Bergvall-Kåreborn and Howcroft, 2014). These features, however, reduce opportunities to socialize by doing away with the need for a workplace. Hence, resources in the form of social support from supervisors and co-workers (Watson et al., 2021) are low in work performed in a dispersed fashion. The restricted platform communication and the lack of collegial interaction food couriers experience seem partly compensated for by social support through their online communities. The digital interactions help communicate their frustrations and provide a means to voice out concerns (Schmidt, 2017). The community allows them to solve common problems and foster feelings of belonging, although these are more transient relationships similar to those described by Ashford et al. (2018).

In contrast, the ICT platform's online community offers a sense of belonging and continuity as they move from project to project. A significant difference lies in the platform decisions (Kuhn and Maleki, 2017) and the resulting design (Choudary, 2018), where consultant platform founders actively encourage networking.

Similar to unpaid work activities described by Choudary (2018), both couriers and consultants engage in work that is not directly related to the task, such as bike maintenance for couriers and developing competence to remain relevant as a consultant. Like Eurofound's (2018) findings, delivery couriers receive little training. There is little incentive to invest in training (Todolí-Signes, 2017: 196) since turnover is high and the platform is clear about freelancers' responsibility for their safety. As such, it is relatively easy to infer that adverse outcomes are expected from a particular imbalance between job demands and resources in delivery work. However, the degree to which the outcomes impact individuals vary, as we shall explain further in the following subsection (4.1.1).

The projects available to ICT consultants are not algorithmically matched. The client's needs, consultant preferences, and expertise determine suitability. By being strategic in project selection and making full use of their autonomy as independent consultants, they provide an opportunity for career and skill improvement. This echoes what Ropponen et al. (2019) identify as a resource in PMW, which creates meaningfulness in their work as consultants. Moreover, the ability to freely select projects through the platform can influence the cognitive load and performance demands of PMW.

Instead of implementing algorithmic control systems that foster a competitive environment (Lane, 2020) and increase performance demands (Lenaerts et al., 2021) and emotional labor (Gandini, 2018), members help implement features that consultants see beneficial to them while providing additional income to the developer performing the task. In other words, operational decisions (Kuhn and Maleki, 2017) taken by the founders, in active consultation with the members, provide them with better autonomy, and subsequent changes aim to deliver better consultant support.

Self-induced work intensity is present in both cases. What sets them apart is the system-induced work intensification present in the delivery platform. The temporary nature of and interest in the project and establishing a good portfolio contribute to the consultant's tendency to overwork. For the couriers, work intensity is most likely caused by fluctuating market demands, low piece-rate payment, and performance-tied work availability. Comparable to online work described by Wood et al. (2019), the consultants have the autonomy to select work, which

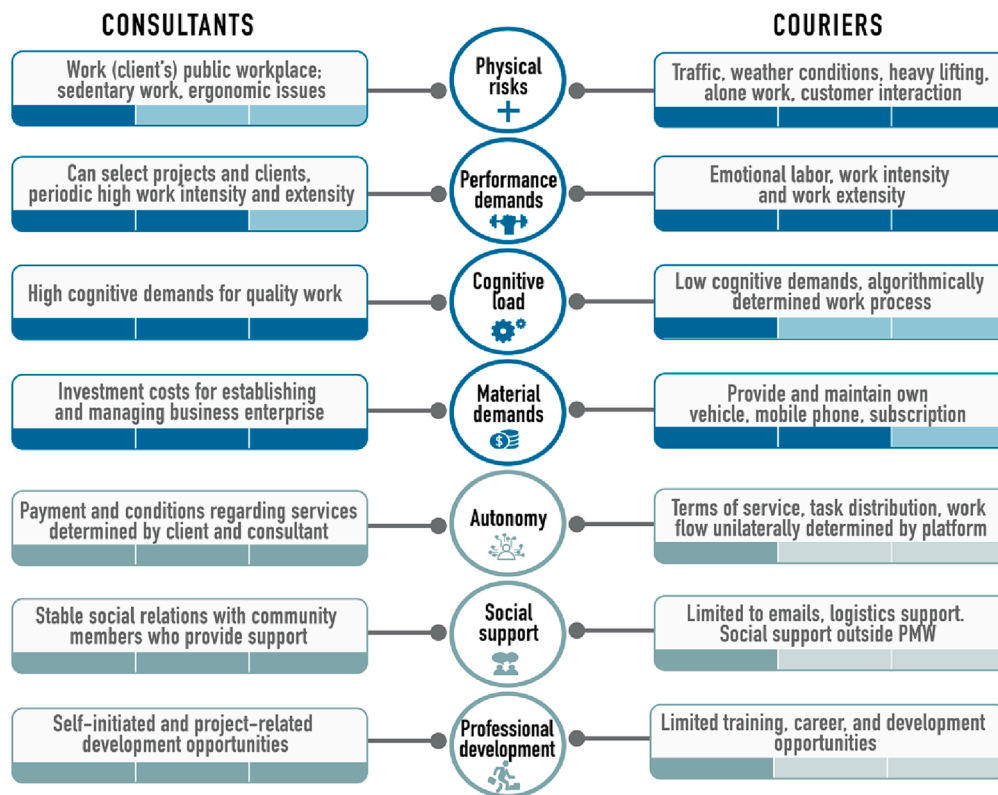


Fig. 3. Job demands and resources in two platforms mediating work – ICT consulting and food delivery.

comes with the advantage of performing various tasks and working on complex and challenging problems. As seen in the ICT case, the same autonomy can also disadvantage them in the form of overwork, sleep deprivation, and exhaustion.

For the couriers, a negative HSW outcome is expected from the low resources coupled with high demands. For the consultants, adequate resources meet the high cognitive, financial, and performance demands, so a positive HSW outcome is expected. Except for one interviewee who opted to return to traditional work for increased job security, most consultants are satisfied with PMW. On the other hand, the couriers exhibit diverse outcomes ranging from positive experiences of PMW to experiencing feelings of 'being stuck,' indicating that personal (Keith et al., 2020; Bakker and de Vries, 2021) and contextual contingencies (Fletcher et al., 2020) may have a role in the variation of outcomes.

4.1.1. The role of personal and contextual contingencies in PMW

Despite working for the same delivery platform, we identified that HSW outcomes vary. The differences in the outcomes may be due to personal and contextual contingencies. Motivation for engaging in platform work, or the push and pull factors, according to Keith et al. (2020), seems to provide a vital role in determining the degree of impact on the individual worker. Those who engage in PMW as a primary source of income expressed greater concern than couriers engaging in PMW as an additional income source or merely as a transitional type of work. Experience also explains why more experienced riders are less affected by features targeting behavior like the delivery estimation time. This points to workers' adaptive capacities (Bakker and de Vries, 2021) that enable them to buffer performance demands.

Despite high demands and low job resources in courier work, some couriers dependent on platform work for income remain positive and take pride in their work, indicating that individual characteristics and mindsets also influence the impact of PMW on workers. Preference for little social interaction, low cognitive strain, or a supervisor's absence may affect work outcomes. The interviews uncovered ways individual

couriers deal with the high demands and income unpredictability through some forms of job crafting, including how they create identity and meaning in their work by differentiating cyclists from riders or embracing the idea of being their boss.

The study further points to the importance of contextual contingencies (Fletcher et al., 2020). Although ICT consulting may be highly commodified in other countries, many companies in Scandinavia value language competence, work closely with consultants over price and therefore choose local consultants. In like manner, many couriers underscore the importance of the welfare system and having a solid union representation - two characteristics in Scandinavian working life potentially moderating the adverse outcomes of high demands and low job resources in delivery work.

Despite having no direct influence on the development of app features, the results indicate an indirect approach to changing some features through management communication with union representatives. The long history of tripartite collaboration in Scandinavia and union interest in PMW offers a possibility for worker empowerment which is unique within PMW. Thus, contextual contingencies (Fletcher et al., 2020) play a role in influencing HSW outcomes.

4.2. Factors influencing the demands and resources of PMW

Based on the analysis, we will discuss two factors that seem to influence job demands and resources in both courier work and ICT consulting. These two factors can thus influence different types of PMW. The factors are denoted *platform changeability* and *labor couplings* and are related to our second research question.

4.2.1. Platform changeability

We introduce the concept of *platform changeability* to describe platform technology's ability to quickly incorporate/remove functions and change work processes with a simple software update. The changeability of PMW features by tweaking platform technology may have potential

repercussions for balancing demands and resources.

Although modern society generally has grown accustomed to clicking the 'Agree' button when installing a software application or visiting a website informing us of cookies, PMW takes 'updates' to an entirely new level (Aloisi, 2015).

4.2.1.1. Implications of platform changeability for delivery work. The PBS implementation in delivery work exemplifies the changeability of the digital framework, enabling platforms to change the rules of the game unilaterally (Griesbach et al., 2019). PBS as a soft control mechanism (Wu et al., 2019) was introduced to counter unproductive behavior and resolve freelancers rejecting long-distance deliveries. However, PBS also increased performance demands due to prioritization in shift schedules. This tweak on the platform can increase physical risks in terms of traffic safety by encouraging workers to take shortcuts. Moreover, the PBS tweak can increase cognitive demands in understanding the implications of the introduced changes and adapting to the evaluation system. The PBS may have reduced their autonomy in selecting schedules and the freelancers' ability to reject orders which would be reflected in their ranking. Thus, the more soft control systems that are introduced, the less autonomy will be experienced by the workers (Shapiro, 2018). Furthermore, social support from fellow couriers may decrease since PBS can increase competition between workers in accessing the best shifts. Hence, demands and resources in PMW can also change swiftly with one single update.

Platform changeability, however, can also improve working conditions by reducing demands or increasing resources. For example, employee involvement through meeting with shop stewards has resulted in the exclusion of performance indicators related to speed (e.g., deliveries per hour) in the ranking calculation and restricted freelancers from rejecting long-distance deliveries, which ended up with employees.

4.2.1.2. Implications of platform changeability for ICT consulting. Platform changeability is also evident in the ICT platform since it is a continuously developing platform. Members themselves actively participate in improving the platform features. The absence of control mechanisms is due to the platform's goal of building a community of trust, which in turn, strengthens social support among the consultants. Consequently, platform changeability can also negatively influence demands and resources in ICT work. For instance, introducing a ranking system or changes in access to available projects can negatively impact social support by increasing competition between members.

Although platform changeability is observed in the two cases, the degree of changeability differs. While the decision locus on changing the platform features is locally situated in the case of ICT, the delivery platform relies on decisions and the development of features outside national boundaries. The changeability of features to suit the local situation is closely linked to the second factor identified in this study, namely, labor couplings.

4.2.2. Labor couplings

The relationship between workers to the organization has become significantly loosened, if not *decoupled*, in the platform economy as companies establish virtual linkages with workers and rely on algorithmic supervision and governance (Kovalainen et al., 2019). We refer to the technology-supported social and formal links workers have to the platform and its members as labor couplings.

Labor couplings can also influence the job demands and resources in PMW. Platform technology facilitates the organization of workers outside the boundaries of an organization, allows temporal or intermittent memberships, and spatially segregated, individualized operations.

4.2.2.1. Implications of labor couplings for delivery work. The delivery platform's technology, available through a simple application

download, enables remote operations and rapid market expansion. Low entry requirements in delivery work (equipment they may already have and minimal training) allow anyone to participate in PMW, thereby extending its labor supply reach. Similarly, the platform's design and business strategy enable arms-length management and limited responsibility toward freelancers performing the same work. As seen in the study, social support is reduced as the physical distance from the supervisors and co-workers increases.

For the couriers, this is evident in the recruitment process, where the low platform requirements allow couriers to start delivery work without face-to-face interaction with management. With the help of technology, platforms organize workers and enable them to operate without needing a physical workspace. Despite employees having an open-ended contract, they remain loosely coupled to the organization due to their limited social interaction with co-workers and restricted communications with management. For freelancers who are even more loosely coupled to the organization, a sporadic start and stop of work engagement is possible despite several months or weeks of being inactive on the platform.

In both courier types, what used to be a company responsibility (Osha, 2016a) has been transferred to the workers in PMW. Hence, the costs of dealing with job demands include material demands that require platform workers to provide their means of production (Schmidt, 2017). The shift of responsibility in providing the necessary equipment can impact HSW outcomes by using substandard tools and equipment or imposing a heavy financial burden on vulnerable workers. Furthermore, the study shows that the loose labor couplings may give young workers the impression that safety is an individual responsibility despite employment contracts and may deter workers from reporting or seeking improvements in working conditions.

Compared to the freelancers, the stronger labor couplings with employees through their employment contracts (and existing regulations) seem to buffer potential consequences from the PBS introduction. Since the employees are guaranteed their contract hours, they will still receive some compensation despite the risk of shift unavailability due to low ranking. Similar to the changeability of platform features, labor couplings can also change and impact the demands and resources the employees have. Since the tasks have been highly standardized (Choudary, 2018), the platform can easily replace employees and operate the service using only freelancers.

4.2.2.2. Implications of labor couplings for ICT consulting. ICT Consultants providing their professional services were in existence before the emergence of the platform economy. Their participation in the platform allows them to extend their network and reach a broader range of potential clients through network effects. In like manner, their labor couplings to organizations needing their services are primarily out of preference for self-determination, flexibility, and development. In contrast to the low-entry requirements of the food delivery platform, the vetting process underscores the platform's focus on creating a network of consultants that provide various ICT competencies to clients. The vetting process ensures the consultants are motivated to pursue their status as independent contractors. Similar to the findings of Keith et al. (2020), their motivations keep them engaged as members despite the lack of projects through the platform. Unlike low-skilled online workers described as having very low social support (Kilhoffer et al., 2019: 88), the community that the highly-skilled consultants built seems to remedy the isolation experienced by the independent contractors in PMW. The low membership churn supports the value of the platform to the members.

4.3. HSW and sustainability of PMW

Our study indicates that personal and contextual contingencies have a role in moderating the outcome of job demands and resources. The

working model presented in Fig. 4 illustrates this. The model also adopts the three fundamental assumptions of JD-R (Lesener et al., 2019) while considering PMW's heterogeneity.

Platform changeability and labor couplings impact HSW by increasing the imbalance of job demands and resources in PMW. The platform economy is attracting a young and healthy workforce with many more years in the labor market. Continued participation in work with an imbalance of demands and resources could have detrimental effects, especially on vulnerable groups – migrants, unskilled workers, and low-income earners relying on PMW.

In the continuing trend toward organizational fragmentation and the increasing number of employment types in contemporary work, these two factors will potentially play a more significant role in considering JD-R and its outcomes in the future.

We have illustrated that PMW is a heterogeneous ensemble of contemporary work that includes different jobs with varying demands and resources. Similar to non-platform counterparts, the resulting balance between demands and resources depends on the type of work mediated by the platform and how the specific PMW features impact these. Additionally, personal and contextual contingencies also play a role in determining the HSW outcomes. Accordingly, measures enabling a more sustainable working life in PMW will involve individual, organizational, and institutional measures.

Acknowledging HSW as a basic human right, regardless of worker status, is critical to promoting sustainable development in PMW. Since personal and contextual contingencies influence HSW outcomes, governmental policies must consider the role of these contingencies. One area for consideration is to ensure that the employability of citizens can be achieved by implementing measures that increase competence in working with technology through education that centers on lifelong learning. Efforts to increase work opportunities help ensure that engaging in PMW is not due to a lack of alternatives. Regulations requiring transparency in introducing new features will also help inform workers of platform work demands and support them in making decisions. Platforms can also be encouraged to be more aware of the HSW consequences of their choices by adopting standards that aim to improve working conditions. Similar to the creation of communities seen in the two cases, stakeholders can actively use existing platform technology (i. e., social media) to inform and educate platform workers, especially young migrant workers.

On the part of the platform, their quest for market dominance should not overshadow the importance of considering social responsibility. In line with the JD-R theory (Demerouti et al., 2001) and the link of HSW to sustainability (Jain et al., 2018), platforms that provide sufficient resources to workers will also reap the benefits of its positive outcomes in the form of healthy, motivated and productive workers. Many of these workers are highly educated individuals who can contribute to innovation and ideas on improving platform services as they interact with the technology and the platform customers. Organizations should therefore consider the benefits of redesigning their digital infrastructure toward a human-centered design (Parker and Grote, 2020). By removing excessive control mechanisms, providing social support, and creating

opportunities for worker interaction and development, platforms can increase worker motivation, decrease turnover, and improve overall performance (Jain et al., 2018).

4.4. Limitations of the study

This empirical study is based on interviews and online observations and aims to explore the work features that impact HSW. The authors acknowledge that JD-R has been primarily used in surveys and quantitative studies. Although using two polar cases would help identify the unique PMW features that impact job demands and resources, we recognize that further studies are needed to support our findings. The model suggested offers a simplified way of understanding how unique PMW features impact working conditions and how these, in turn, impact HSW and the promotion of sustainability. The *specific* pathways between the job demands, resources and HSW outcomes are beyond the scope of this study. Finally, HSW outcomes are simplified for building the proposed framework, and due to the limitations of the study, point mostly to positive and negative experiences and HSW issues specific to each case (e.g., traffic accidents vs. ergonomic health issues). Potential sources of bias include participant selection based on accessibility and communication using a second language. The COVID-19 pandemic restrictions and the small gift card amount may have limited the recruitment of low-income workers relying primarily on PMW.

5. Conclusion

PMW has some hallmarks potentially at odds with sustainable working life, including platform changeability and labor couplings. Still, our study has illustrated that HSW varies in different forms of PMW and that personal and contextual contingencies moderate outcomes. The study indicates that ensuring a balance between job demands and resources may prove more challenging in low-skilled services, as they are more susceptible to standardization of tasks and subject to various forms of algorithmic control than high-skilled workers. In reaching sustainable development goals, the United Nations has underscored that we must focus on the most vulnerable groups so that no one will be left behind (UN, 2021).

Common factors in PMW, such as platform changeability and labor couplings, do not automatically result in adverse HSW outcomes. As seen in the study, platform changeability can improve working conditions by involving workers so that new functionalities serve as support rather than additional restrictions. The same is true for labor couplings. For genuine independent contractors, platforms increase social support and provide stable relations in an otherwise individualized work situation. Labor couplings can be a positive feature of PMW if used to provide easy access to additional income and build supportive communities. However, this depends on the careful design of work that enables a healthy balance between job demands and resources and on the degree of responsibility platforms are willing to acknowledge. The most expedient action lies in how policies and regulations determine the rules of engagement in the platform economy so that the HSW of workers

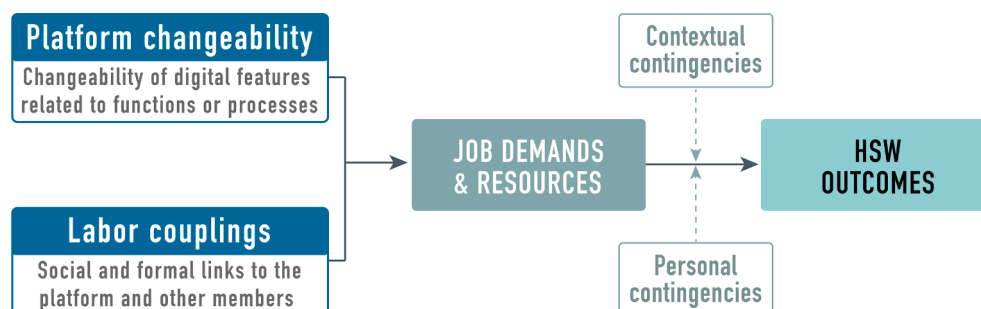


Fig. 4. PMW-specific factors influencing job demands and resources (adapted from Keith, 2020).

remains in focus. Like technological innovation, regulations will need innovative ways to identify vulnerable participants in PMW and provide them with a decent level of protection.

We echo [Kenney and Zysman \(2016\)](#) in underscoring that although digital platforms impact the foundations of society in terms of work, production and consumption, the outcome will be determined by what we value as consumers, what policies are implemented, and how businesses devise their game plan.

CRedit authorship contribution statement

Marie Nilsen: Visualization, Project administration, Methodology, Formal analysis, Data curation, Conceptualization, Validation, Writing – original draft, Writing – review & editing. **Trond Kongsvik:** Supervision, Methodology, Data curation, Conceptualization, Validation, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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