Digitalization of Employment: Working via Online Platforms

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1 Introduction

Under the heading of digitization, a fundamental change in the world of work is being addressed in public and scientific debates (OECD, 2019). Digitization refers to the increasing dissemination of modern information and communication technologies (ICT) across the world of work, driven by a constant increase in computing power and the use of artificial intelligence at work. Changes can be observed at the macro, meso, and micro level (Korunka & Kubicek, 2017) involving new challenges for organizations and individuals (Pongratz, 2009). At the macro level, digitization is integrated into already known changes such as the emergence of international markets, the tertiarization of the working world, individualized products, or the decrease of regulations on the labor market (Watson, 2011). What is new is the acceleration of change through available technologies (Rosa, 2005). This can also be observed at the organizational level (meso level). Organizations are in a continuous restructuring process to adapt to changing market requirements (Gazier & Bruggeman, 2008). The restructuring processes aim at organizational growth, cost reductions, and quality improvements by simultaneously maintaining or improving the market position. In this context, a change in organizational structures and the organization of work can be observed. For instance, we see the emergence of more flexible, project- and customer-oriented forms of management and flatter hierarchies, in which work is done in a results-oriented manner (Green, 2001; Menz & Kratzer, 2015). Changes at the societal and organizational level are also reflected at the micro level, that is, the individual work situation: work content, work context, and work organization but also the way individual employees organize their

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non-working life are changing as well (Cascio, 2003). One example is the increase in flexible work in terms of time and space (Gerdenitsch, 2017).

In light of the changing world of work as a result of digitization, one phenomenon directly related to changes in work organization and the individual's work situation is the platform economy, which has recently received a lot of attention. Platform work increasingly shapes our everyday life, as we make use of food delivery, driving, and household services, for example, but it is also found in online work such as copywriting and programming or creative activities. The use of new technologies enables platforms to act as "employment agents" on the Internet; a global online labor market has emerged. In this chapter, we focus on crowdwork, representing one specific type of platform work. Platform work refers to a form of employment that uses an employer's/client's access to organizations or individuals to perform certain tasks for a fee (see Florisson & Mandl, 2018). In particular, crowdwork refers to digital platforms that organize various services, ranging from so-called clickwork or micro tasks to more demanding and qualified activities such as graphic design or website programming (Kirchner & Matiaske, 2020), in a fully digital workflow. In this contribution, we discuss opportunities and risks related to platform work in general but also to crowdwork in particular. For instance, being independent of local workplaces is an opportunity for individuals who have so far been denied access to the labor market because of social (e.g., illness, criminal records) or geographical (e.g., rural regions) exclusion (Zyskowski et al., 2015; Kittur et al., 2013) and may hence be considered an advantage. At the same time, there is a risk that organizational forms of work and the associated labor protection frameworks may be undermined, resulting in a precarious digital labor market. The first aim of this chapter, therefore, is to review existing studies with respect to the organizational and working conditions of platform workers and crowdworkers.

In the public debate, platform work is often described as an entirely new form of digital work that breaks with the regulations governing traditional employment relationships. Some studies point out that platform work may be new – but not so much as a distinct new form of work but rather as an extreme example of a much broader set of trends affecting all employment forms (Gerber & Krzywdzinski, 2019; Huws et al., 2018). Based on this assumption, the second aim of this paper is to take a closer look at the work situation of employees in digitized work environments. Drawing on the BAuA-Working Time Survey, we empirically analyze the working conditions of employees using information and communication technologies (ICT, i.e., desktop PC, laptop, or tablet PC) in general and compare these figures with the results of our review of platform worker studies presented. The chapter is structured as follows. In a first step, we define platform work and crowdwork (Chapter 2.1) and describe the developments on the labor market to date, which provide starting points for the analysis of platform work (Chapter 2.2). We also summarize previous literature to give an overview of how platform work is distributed across the labor market and to identify the typical platform or crowd worker (Chapter 3). In a second step, we look at the organizational conditions and the work situation of platform workers (Chapter 4.1 and 4.2) on the basis of existing studies and compare them to the situation of employees using ICT in general (Chapter 4.3).

2 Definition and Theoretical Background

2.1 Definition of Crowdwork

Although the literature offers various definitions and concepts of online platforms (Eurofound, 2018a; Huws, 2016; Broughton et al., 2018), they all consistently emphasize the fact that online platforms enable innovative business models and new forms of work organization. The platform economy comprises a variety of platforms with various purposes, including search, networking, and messaging platforms (e.g., Google) or trading platforms (e.g., Amazon), as well as brokerage platforms for various products or services (e.g., Etsy; Kirchner & Matiaske, 2020). With regard to work, platforms offering paid work tasks online are of particular interest (e.g., Uber, CrowdFlower, and Amazon Mechanical Turk). Buying and selling jobs and services via online platforms is known as "platform work" (Florisson & Mandl, 2018; Eurofound, 2019), "online labor" (Beerepoot & Lambregts, 2015; Pongratz, 2018), "online outsourcing" (Kuek et al., 2015; Heeks, 2017), or "gig economy" (Wood et al., 2019; Taylor et al., 2017). Crowdsourcing and crowdwork are among the most commonly used terms (Green et al., 2014; Leimeister et al., 2016a; Durward et al., 2016; Huws et al., 2018). Platform work covers different ways of working that can be broken down further along several dimensions (Eurofound, 2019). One central distinction is made as to whether the work arranged via platforms is fully digital[1] or performed offline. Another criterion of distinction, especially for online work involving online management, is the skills level required for a specific task. Platform jobs range from high-skilled work such as programming, translation, design, or copywriting to routine micro tasks such as indexing pictures (Huws, 2018; micro tasks are sometimes also referred to as "clickwork"; Kirchner & Matiaske, 2020). Further criteria include workers' employment status (employment or self-employment), customer status (company or private client), whether the job is performed as a main job or a supplementary source of income, and type of payment (e.g., regular salary, hourly rate, or piece rate; Huws, 2016). An overview of possible classifications of platform work is offered by various authors (e.g., Florisson & Mandl, 2018; Huws, 2018; Heeks, 2017; Howcroft & Bergvall-Kåreborn, 2019; Schmidt, 2016; Greef et al., 2020). In the following, we mainly focus on online work defined as paid employment, arranged and processed via an online platform. Thus, both service provision and the result are digital. In line with Bormann (2018) and Pongratz and Bormann (2017), we refer to this as crowdwork. Since studies do not always explicitly report results for crowdworkers as defined here, we will also discuss results for platform workers in general.[2]

[1] This is referred to as "cloudwork" (Leimeister et al., 2016a) or "online task crowdwork" (Howcroft & Bergvall-Kåreborn, 2019), for example, sometimes also called "crowdwork," "crowdsourcing," or "online work" (Pongratz & Bormann, 2017).

[2] Findings referring to platform work performed locally or offline are not the focus of this chapter and can be found in Schreyer and Scharpe (2018), Ivanova et al. (2018), or Lee et al. (2018), for example.

2.2 Changing World of Work: Marketization, Flexibilization, and Subjectification

Although platform work as a phenomenon is quite new, the existing empirical evidence shows similarities to previous developments. Platform work is used to develop new potential for productivity and rationalization by mobilizing mechanisms of marketization, flexibilization, and subjectification (Gerber & Krzywdzinski, 2019). Companies are increasingly confronted with economic pressure and unpredictability because of changes in the market. It is not new for companies to use outsourcing strategies such as contract labor or temporary agency work to purchase services to cover irregular and temporary changes in labor demands and to reduce labor costs (Clott, 2004). The outsourcing of digital work tasks by companies to digital platforms, which in turn delegate them to an undefined mass of people on the Internet, represents another strategy to increase flexibility and reduce costs. Thus, work on many platforms is not performed in a formal employment relationship; instead, platform workers are often self-employed (Berg, 2016). Self-employed work arranged via digital platforms often appears to be highly marketized. This directness of the market often goes hand in hand with job insecurity, strong competition, and low wages. As a result, platform work is often far removed from the regulated context of standard employment, offering flexibility and freedom on the one hand while on the other hand enabling adverse work situations and the exploitation of labor (Kirchner & Matiaske, 2020). Existing studies have already shown outsourcing strategies to lower labor standards in terms of pay or working hours (Benner, 2015; Ittermann et al., 2013).

In addition to its strong marketability, platform work, and especially crowdwork, also offers workers much flexibility and freedom in terms of time, place, content, and social life. The various flexibility options may help them improve their work-life balance. However, workers also face a high risk of blurring boundaries between their work and private life or between their professional role and personal identity. Likewise, the boundaries between paid and unpaid work can be fluid (Gerber & Krzywdzinski, 2019). Crowdwork thus requires a high degree of self-organization and self-control (Stone, 2004; Flecker et al., 2017). Therefore, platform work is also a highly subjectified kind of work. Platform workers are responsible for every aspect of their work: actively producing and marketing their abilities and services; planning, controlling, and monitoring their actions; and organizing their everyday life (Pongratz & Voß, 2002). Platform work thus represents an ideal type of "labor power entrepreneurs" (Voß & Pongratz, 1998). In summary, this autonomy and flexibility may open up opportunities for a self-directed work life, but it may also promote self-exploitation (Kubicek et al., 2017). Some studies show that flexibility and job autonomy have a dark side if they exceed a certain level. Workers can be "lost in autonomy," which in turn is associated with a lower level of health and well-being (Väänänen et al., 2020). Studies on self-employed individuals already point to that ambivalent role of flexibility and autonomy at work (Kottwitz et al., 2019).

3 Distribution and Sociodemographic Characteristics of Platform and Crowdworkers

3.1 Distribution of Platform and Crowdworkers

Platform work, including crowdwork as such, is a new phenomenon for which limited official data is available. Further, no standardized measure for this specific group of workers has yet been established. Consequently, definitions of platform and crowdwork are inconsistent across studies, resulting in the fact that very different questions are used in surveys to capture platform work (Pesole et al., 2019). Furthermore, Bonin and Rinne (2017) show that respondents often mistakenly classify themselves as platform workers or crowdworkers, for example, because they think selling goods and services via their own homepage is platform work. Keeping these difficulties in mind, we nevertheless try to give an overview of the distribution of platform work and crowdwork across recent studies (Table 1). We focus on studies providing estimates for the period from 2017 to 2020.[3] With regard to platform work, we further distinguish between individuals who have at least once worked as platform workers and individuals who do this on a regular basis. The overview shows that the proportion varies substantially across studies and countries. With regard to platform work, the proportion varies between 7.8% (France) and 27.5% (Spain) for people who have done this type of work at least once. Platform work on a regular basis ranges from 1.0% (USA) to 17.0% (Spain). On average, the studies indicate that in the EU, 11.0% of the workforce work as platform workers (on a regular basis: about 5.5%). Regarding crowdwork in a narrow sense, the proportions vary between 2.6% in Germany and 14.3% in Spain. Given the large differences in prevalence across the selected studies, it is difficult to make a precise statement about the distribution of platform work and crowdwork, respectively. It is thus not surprising that some of the existing studies conclude that the distribution of platform work and crowdwork is rather limited (e.g., Bonin & Rinne, 2017; Farrell & Greig, 2016; Current Population Survey staff, 2018) whereas other studies find platform and crowdwork to be widespread (e.g., Huws et al., 2019; Pesole et al., 2018). Across the selected studies, however, platform work emerges as particularly prevalent in Spain.

Suggesting another reason for the vast variation in proportions, Pesole et al. (2019) state that the interviewing method – online vs. offline – may be crucial as well. As working on platforms inherently involves a high level of Internet usage, it is plausible to assume that online surveys include a higher number of platform workers and lead to an overestimation platform and crowdworkers.

Huws et al. (2019) use different survey methods, offline and online, allowing for a direct comparison of results. Comparing platform work rates in the UK and Switzerland, the authors show that the rates are higher in online surveys than in

[3] Information about the distribution of platform work before 2017 can be found in Eurofound (2018b), Florisson and Mandl (2018), and Freudenberg et al. (2019), for example.

Table 1 Distribution of platform work and crowdwork – a study overview

Source	Survey year	Country	Platform work – at least once[1]	Platform work – on a regular basis	Crowdwork – at least once
Urzì Brancati et al. (2020)[a]	2018	Germany	12.3%	5.7%	–
		Spain	18.1%	9.3%	–
		France	7.8%	3.7%	–
		UK	12.8%	7.3%	–
		EU-16 (average)	11.0%	5.5%	–
Huws et al. (2019)[b]	2018	Spain	27.5%	17.0%	14.3% [2]
	2019	France	15.4%	7.7%	6.1% [2]
	2017	Italy	21.7%	12.4%	10.4% [2]
	2019	UK	15.3%	9.6%	7.8% [2]
Pesole et al. 2018[c]	2017	Germany	11.8%	6.6%	10.0%
		Spain	15.1%	6.6%	12.0%
		France	8.8%	4.2%	6.5%
		UK	12.6%	6.7%	10.2%
		EU-14 (average)	11.9%	5.6%	–
Current Population Survey Staff (2018)[d]	2017	USA	–	1.0%	–
Serfling (2018)[e]	2017–2018	Germany	7.7 %	4.8%	
Lepanjuuri et al. (2018)[f]	2017	UK		4.4%	
Mrass and Peters (2017)	2017	Germany			2.6%*

On a regular basis means:
[a]Minimum 10 hours per week or minimum 25% of the person's income
[b]At least weekly
[c]Minimum 10 hours per week
[d]Platform work in the last week
[e]Actual active platform workers
[f]Worked in the gig economy in the last 12 months
[1]Platform workers who have ever gained income from providing services via online platforms
[2]At least weekly
*Own calculation based on the working population in Germany (total number: 1,162,059)

corresponding offline surveys. The majority of the studies discussed are also based on online surveys (Pesole et al., 2018; Urzì Brancati et al., 2020; Serfling, 2018; Lepanjuuri et al., 2018). The studies of Pesole et al. (2018), Serfling (2018), and Urzì Brancati et al. (2020) report the distribution of platform work among Internet users, while the other studies – with the exception of Mrass and Peters (2017, estimations based on information from platform CEOs) – report the distribution in the labor force (Current Population Survey Staff, 2018) or general population

(Lepanjuuri et al., 2018). Given the existing methodological challenges in measuring platform work and crowdwork, the values reported have to be interpreted with caution.

Given the (methodological) challenges mentioned above, it is also difficult to determine whether platform work or crowdwork has become more important in recent years. One exception is the Collaborative Economy and Employment (COLLEEM) survey, which analyzes platform work in selected EU Member States (Pesole et al., 2018; Urzì Brancati et al., 2020). Comparing the two existing waves reveals a slight increase in the prevalence of individuals who have at least once gained income from providing services via online platforms from 9.5% to around 11% (Urzì Brancati et al., 2020).

The Online Labour Index (OLI) is another possible data source, measuring the utilization of online labor across countries and occupations by tracking the number of projects and tasks posted on major online platforms (Kässi & Lehdonvirta, 2018, p. 2). The Index indicates that between May 2016 and May 2020, the utilization of online labor increased by around 72 index points (i.e., 72%) worldwide.[4] After a decline in recent months, the index value is currently at around 118 (August 3, 2020). Based on the results of the OLI and in line with other studies (Farrell et al., 2019), it is reasonable to assume an increase in the importance of the platform economy. The current COVID-19 pandemic, which forces some employees to compensate for job losses or financial losses, may also lead to a further increase. However, given the interplay of various factors, it is unclear whether the platform economy, including crowdwork, will indeed continue to grow. On the one hand, technological developments and new product ideas may lead to further growth. The growing proportion of digital natives in the labor market may also result in an increase, as they are assumed to be more open-minded with respect to new technologies and new forms of work. Moreover, crowdwork in particular is an attractive option for specialists in global demand, because it gives them the necessary flexibility. On the other hand, stronger government regulation of platform work may inhibit its growth. Similarly, the growing desire of the working population for secure employment may also prevent further growth. Moreover, parts of platform work might be substituted by algorithms, artificial intelligence, and machines (Freudenberg et al., 2019). These opposing potential developments make it difficult to predict the relevance of platform and crowdwork in the future.

[4] The index is normalized so that 100 index points on the y-axis represents the daily average number of new projects in May 2016 (https://ilabour.oii.ox.ac.uk/online-labour-index/).

3.2 Sociodemographic Characteristics of Platform and Crowdworkers

Since the studies only rarely report differentiated results for crowdworkers (i.e., platform work that is performed completely online), the following sections discuss results for platform workers in general, thus also including non-digital platform workers. If specific results for crowdworkers are available, they are reported separately.

Most studies find the *gender* ratio to be balanced or that men tend to predominate in platform work (Marshall and Shipman, 2015; Huws et al., 2016). In the UK, for example, 54% of respondents are male; in Italy, men make up 45% and in Estonia 69% (Huws et al., 2019). Furthermore, Pesole et al. (2018) indicate that the proportion of women decreases as the amount (regarding income and/or working hours) of platform work increases.

Platform work can be found in all *age* groups, but it is more prevalent among younger individuals (e.g., Huws et al., 2019; Lepanjuuri et al., 2018; Kuek et al., 2015) with 40–50% of platform workers younger than 35 years (Bertschek et al., 2015; Huws et al., 2016). The proportion of young platform workers also increases with the amount (regarding income and/or working hours) of platform work (Pesole et al., 2018).

The existing studies mainly find that platform workers are highly *educated* (e.g., Ipeirotis, 2010; Berg et al., 2018; Serfling, 2018). This is not surprising, given that digital platforms appear to be used more frequently by Internet users, a subpopulation with an above-average educational level. Furthermore, Pesole et al. (2018) and Urzì Brancati et al. (2020) point out that the highest educational attainment varies across age groups and that the proportion of respondents with high education is substantially lower among very young platform workers (aged 16–25). This can simply be explained by the fact that many platform workers aged 16–25 have not yet completed their tertiary education.

The results regarding the *employment status* of platform workers are ambiguous. A literature review by Freudenberg et al. (2019) shows that between 31% and 68% of platform workers are employees. In the group of crowdworkers, the share of employees varies between 34% and approximately 50%. Regarding the prevalence among other employment groups, the proportion of self-employed platform workers and crowdworkers varies across studies between 5% and 13%, while 6–13% are students/pupils, and about 2% are retired employees (Huws et al., 2017; Pesole et al., 2018; Urzì Brancati et al., 2020). The differences in employment status can partly be attributed to differences across countries. Overall, it is surprising that the vast majority of platform workers, including crowdworkers, report to be employees. This might be explained by how employment status is measured in the surveys, as respondents are most often asked to define what they believe is their main or primary employment status (e.g., Berg et al., 2018; Lepanjuuri et al., 2018). Therefore, it remains unclear whether the platform work is carried out in an employed or self-employed relationship, as platform work is often not the main/primary employment.

Freudenberg et al. (2019) assume that the individuals are employees in their main job and platform workers in their secondary job (hybrid employment). In line with this result, it can be assumed that platform workers are more likely to be self-employed (Jäger et al., 2019).

The *income* earned through the platforms also indicates that platform work tends to be performed as a sideline. Only about 25–30% of platform workers report to have earned at least half of their income through platform work (Berg et al., 2018; Pesole et al., 2018; Huws et al., 2016). The study of Berg et al. (2018) points to a similar direction, finding that 32% of crowdworkers performing micro tasks identified crowdwork as their main source of income. The largest proportion of platform workers generates a maximum of 25% of their income via platforms (e.g., Sweden 46%, Austria 73%, Huws et al., 2016; EU-14 (average) 38%, Pesole et al., 2018). Furthermore, the studies point out that the income earned through platform work varies substantially and depends on the specific task performed (Eurofound, 2018c). In the German study by Serfling (2018), platform workers earn on average €808 gross per week, with 40% generating more than €1000 per week and 22% earning less than €25 a week. Studies also show strong differences in terms of hourly wages. For highly qualified crowdworkers, the hourly wage varies between €5 and €20. However, experts could also receive a wage of more than €100 per hour. For crowdworkers performing micro tasks, the gross hourly wages tend to be between €1 and €5 (Freudenberg et al., 2019). This finding thus emphasizes that crowdwork and platform work in general are accompanied by unpaid work, for instance, related to generating new business. De Groen and Maselli (2016) show that the effective hourly wages are up to 60% lower when unpaid working time is taken into account.

4 Work Situation of Platform Workers and Crowdworkers

It is clear from the above that platform work, including crowdwork, represents a specific form of employment, because digital platforms take over digital work tasks from companies and assign them to people on the Internet. The review of existing studies also indicates that platform work is mainly carried out as self-employed work. Both aspects imply that the organization of work is rather different from employment outside the platform. Furthermore, the advantages and disadvantages of platform work have recently been discussed very intensively. Table 2 briefly summarizes the possible advantages and disadvantages of platform work in general.

In the following, we take a deeper look at how platform work, and especially crowdwork, is organized and what this means in terms of working conditions.

Table 2 Advantages and disadvantages of platform work

Advantages	Disadvantages
Enables access to work for people who would otherwise be excluded (e.g., people with disabilities, caregivers, persons in economically deprived areas)	Precarious employment
Additional income	Health and safety risks (e.g., non-ergonomic workplaces, high work intensity, monotony)
Flexibility (time and space)	Job insecurity
Autonomy	Lack of control
Anonymity	Lack of social standards/protection
Enables social innovations	No/low employee participation
Low-cost access to employees around the world for companies	Social isolation
	Digital monitoring
	Nontransparent rating systems

Based on Berg et al. (2018), Eurofound (2019), Haider (2018), Huws (2016, 2018), and Schramm & Tietgen-Simonsen (2019)

4.1 Organizational Conditions

Working Hours As mentioned above, platform work in most cases is performed as a secondary activity in addition to regular work. It is not surprising, therefore, that platform workers more often report to work more than 40 h per week as compared to non-platform workers (Pesole et al., 2018; Urzì Brancati et al., 2020; Huws et al., 2017). This result has already emerged in other studies on multiple job holders (Hünefeld, 2019; Marucci-Wellman et al., 2014). In addition, Pesole et al. (2018) and Urzì Brancati et al. (2020) point out that full-time platform workers are almost twice as likely as non-platform workers to report more than 60 h of work per week. However, the number of hours per week spent on platform work alone is highly variable, ranging from 4 to 29 h in the COLLEEM study (Pesole et al., 2018; Urzì Brancati et al., 2020), for example. The authors report that the number of hours in non-platform work tends to decline when the amount of platform work increases. Leimeister et al. (2016b) also show that the number of hours worked by crowdworkers also varies by task. In their study, crowdworkers performing micro tasks had a maximum weekly working time of 25 h, while those with more complex tasks reported up to 80 h.

Platform workers and crowdworkers also more often report non-standard work schedules. For instance, Urzì Brancati et al. (2020) report that more than two thirds of all platform workers work on weekends and at night. Similar results can be observed for crowdworkers performing micro tasks. The authors argue that platform workers must look for new jobs all the time and that the idiosyncrasies of job posting, as well as differences in time zones, lead to long and atypical working hours (Berg et al., 2018).

Payment There are three different ways of getting paid for platform work: (1) based on tasks performed (piece-rate pay), (2) based on time worked, and (3) based on fixed daily, weekly, or monthly payments. The COLLEEM study shows that approximately 60% of platform workers get paid based on tasks performed; 25–39% get paid based on time worked; and 7–16% are paid a fixed daily, weekly, or monthly rate (Pesole et al., 2018; Urzì Brancati et al., 2020). However, the study also shows that the basis of remuneration depends on the amount of platform work. For instance, 51% of full-time platform workers are paid based on fixed daily, weekly, or monthly rates, in comparison with 29% of the less frequent platform workers. The authors of the study also point out that the high proportion of platform workers getting paid based on tasks performed or time worked indicates that many of them have to do a significant amount of unpaid work (online search, waiting for tasks, etc.) to get paid work (Urzì Brancati et al., 2020).

Legal Regulations and Social Protection The quality and amount of social protection (e.g., pension insurance, health and nursing care insurance, unemployment insurance) for new forms of employment and the way it is legally regulated (e.g., via an employment contract) is a key question. Although this is still a new field of research in the area of platform work – regulations differ by country and platform (Leimeister et al., 2016b) – we make a first step and try to give an overview of the most important findings from existing studies.

Given that platform work is mainly performed on a self-employed basis, numerous insurance and protection regulations do not apply, including overtime compensation, minimum wage protections, vacation pay, health insurance, disability insurance, unemployment insurance, maternity and paternity leave, or paid sick leave (Freudenberg et al., 2019; Huws et al., 2016). Using Amazon Mechanical Turk (AMT) as an example, Berg et al. (2018) show that AMT explicitly states that crowdworkers perform tasks as independent contractors, not as employees of the company, and that they are not entitled to company benefits like vacation pay, sick leave, or insurance programs. In line with this example, Berg et al. (2018) also reveal a lack of social protection of crowdworkers performing micro tasks. While at least 61% of the respondents were covered by health insurance, only 35% had a pension or retirement plan, and only 16% had unemployment insurance. In line with Leimeister et al. (2016b), the study points out that whether crowdwork is carried out as a main or secondary activity is crucial for workers' social protection status. Those who perform crowdwork as a secondary activity were more likely to have health insurance and other social insurance benefits as part of their main job (or dependents' co-insurance) than those whose main source of income was crowdwork.

Certainly, various European and non-European countries offer very different forms of protection for self-employed persons, sometimes with very specific regulations (Freudenberg et al., 2019). Based on a study of national policies in 35 European countries, Spasova et al. (2017) show that self-employed individuals in Romania, the Netherlands, the UK, Spain, and Germany are only partially covered by pension insurance. Furthermore, as many platforms have their headquarters outside Europe,

it can be assumed, at least for European crowdworkers, that they carry out cross-border platform work. At first glance, it is thus not always clear which legal regulations apply. Moreover, as self-employed individuals, platform workers cannot rely on company-related mechanisms such as co-determination in order to improve their work situation. In addition to the lack of safety and protection regulations, platform workers do not receive any company benefits (including access to HR measures such as training, mentoring, or coaching; Eurofound, 2018c).

Management of Work Processes Technology is a core element of platform work, serving as the main tool for allocating tasks, process monitoring and rating, and communicating with employees and customers but also for processing payments (Huws et al., 2017). More specifically, algorithmic management of the work force is a key feature of digital work platforms (Berg et al., 2018). This means that tasks are assigned to the crowd by algorithms and tracked data; algorithms also optimize and evaluate the work done (Lee et al., 2015). In line with this, about 60% of the platform workers in the COLLEEM study, for example, report being under constant monitoring, and approximately 70% emphasize that ratings are key for getting work on platforms. The study also highlights that the distribution of monitoring and the importance of ratings depend on the type of platform work. Thus, these two aspects are more pronounced in online professional work than in online micro tasks, for instance (Urzì Brancati et al., 2020).

In contrast, the dependence of platform work on technology and algorithmic management goes hand in hand with a certain degree of anonymity, which some service providers prefer. On the other hand, this may also imply certain problems. Employer or customer ratings have a high impact on whether the employee is given additional tasks, is able to charge a reasonable fee, or whether he or she remains in the database at all, for example (Eurofound, 2019; Huws et al., 2016). This system could also result in unfair ratings. Qualitative studies in particular indicate that platform workers are repeatedly confronted with unfair ratings and that it is difficult to challenge them (Huws et al., 2019; Berg et al., 2018). The rating systems can also lead to a power asymmetry (Kingsley et al., 2015). Some respondents report that customers are aware of their power over platform workers through the rating system and use this to their advantage (Huws et al., 2017). Furthermore, the rating systems are often not transparent, and/or ratings may not be fully accessible to the platform workers (Huws et al., 2019). As a consequence, workers face an increased risk of experiencing stress from being continuously evaluated and assessed (Garben, 2017).

Another specific difficulty results from the lack of opportunities to communicate with the platforms. Sometimes, the only way to communicate with the platforms is via email, and there is often no direct contact person in the case of problems (Huws et al., 2017, 2019). One aspect of the poor communication between platform and platform workers is the arbitrariness of decisions. For example, platform workers report that they could not accept tasks or were deactivated on the platform or their work was rejected without explanation (Huws et al., 2017). Berg et al. (2018) report that almost nine out of ten workers in the ILO survey saw their work rejected or payment refused. Only 12% of respondents said that all rejections were justifiable.

The authors also show that platform workers are frustrated by their inability to appeal unfair rejections. Asymmetric information between client, worker, and platform is also reported. Whereas workers usually have little information about the client and the tasks to be performed, clients have detailed information about the worker through rating systems and profiles (Eurofound, 2018c; Florisson & Mandl, 2018).

The unpaid time of waiting or bidding for work also represents a challenge in platform work (Broughton et al., 2018; Huws et al., 2017; Berg et al., 2018). First, platform workers report periods waiting for work (Huws et al., 2017). Second, since platforms are located in different time zones, it is necessary to check regularly whether new tasks are available (Berg et al., 2018). Third, companies assign their tasks through competitions, meaning only the best worker is selected and thus paid (Jäger et al., 2019).

Finally, the organization of work via online platforms results in challenges regarding data protection and privacy. Workers often have to disclose personal information if they want to get jobs through platforms. Furthermore, behavioral data, such as the number of clicks on a page or likes, can be recorded, analyzed, and used for internal purposes or sold to third parties. For the worker, it is not always clear whether their data is handled confidentially (Eurofound, 2018c; Florisson & Mandl, 2018).

4.2 Job Demands and Outcomes[5]

For a safe and healthy workplace, it is not only the organization of work that matters but also the specific working conditions. In a first step, we evaluate the working conditions of platform workers based on existing studies. To the best of our knowledge, studies allowing for a direct comparison of the working conditions between platform workers and non-platform workers are scarce. In a second step, we therefore analyze the working conditions of employees who also work extensively with ICT (self-employed individuals and employees) in order to gain a better understanding of the differences and similarities of platform work and digitized employment forms outside a platform.

Flexibility, Autonomy, and Control As discussed earlier, a central aspect associated with platform work is flexibility (e.g., Berg et al., 2018; Graham et al., 2017; Huws et al., 2017). Urzì Brancati et al. (2020) show, for example, that 80% of platform workers characterize their work as highly flexible. In the qualitative study of Broughton et al. (2018), platform workers commonly respond that they are able to make their own decisions regarding when and how long to work and what tasks to do. The study also shows that individuals with childcare responsibilities doing

[5] A summary of the most important literature on the working conditions of platform workers can be found in Florisson and Mandl (2018).

online administrative tasks are especially appreciative of the high degree of working time flexibility. At the same time, this flexibility involves a high degree of autonomy, and platform workers have control over scheduling their work tasks (Berg et al., 2018).

However, some platform workers also report a lack of flexibility, autonomy, and control. For instance, offers are often made at the last minute, leading to short-term changes of plan (Broughton et al., 2018). In addition, work might not be available when the platform workers plan to work (Berg et al., 2018). Finally, customers and platforms have a certain degree of control over the platform workers via the rating system (Huws et al., 2017). In the study of Serfling (2018), for example, about 30% of respondents report that they have little or no control over the time they spend completing paid tasks mediated via online platforms. The degree of flexibility, autonomy, and control varies by platform and type of work. For example, offline platform workers have less control over when, where, and how they perform the tasks than crowdworkers (De Groen et al., 2018). Likewise, online clickworkers have less autonomy and control over their work than other platform workers. The technology enables the monitoring of workers while the task is being performed. For example, non-compliance with instructions provided by the platform can be detected, resulting in negative consequences for the workers (Eurofound, 2019).

Job (In)security The previous findings already suggest that platform work can be associated with increased job insecurity. First, the lack of social protection resulting from the status of self-employment is accompanied by uncertainties. Second, the often short duration of tasks, the varying availability of orders, the lack of a guaranteed minimum wage, and competition lead to low security for workers (Florisson & Mandl, 2018). Third, the unpredictability of work opportunities also results in unpredictability of income (Eurofound, 2019).

Work Intensity and Stress On the one hand, platform work – especially crowdwork – goes hand in hand with a fast work pace. By working fast, more tasks can be completed, and thus more money can be earned. Furthermore, a fast pace of work can also be accompanied by better ratings, thus leading to more job offers (Broughton et al., 2018). Platform work also goes hand in hand with the expectation that workers respond quickly to incoming tasks/orders (Huws et al., 2017). Eurofound (2019) also points out that increased work intensity in platform work especially occurs when customers underestimate the amount of work a job requires. On the other hand, platform workers also report periods during the year in which not enough work tasks are available (Broughton et al., 2018). Analyzing clickworkers, the study of Berg et al. (2018) points out that a frustrating part of platform work is waiting for tasks and that 88% of respondents would like to work more. For 58%, the reason is that not enough jobs are available. Similar results can be found in Graham et al. (2017), who emphasize an oversupply of labor as one risk of platform work.

In the study of Leimeister et al. (2016b), crowdworkers rated time pressure and workload as moderate to poor. Crowdworkers performing testing tasks gave the

lowest ratings for both aspects compared to crowdworkers performing micro or design tasks, for example. Furthermore, the studies indicate that platform work involves a variety of tasks, including cognitively demanding tasks (Leimeister et al., 2016b; Huws et al., 2017). For example, in the study of Graham et al. (2017), 53% report a diversity of tasks, including solving complex tasks. However, in other studies, platform workers also report that their work is monotonous (Pesole et al., 2018; Urzì Brancati et al., 2020). Overall, the studies conclude that platform workers are able to influence the intensity of their work. However, this can also vary according to the type of platform work performed and the specific platform. Work intensity is likely to increase, for example, if the calculated time is too short (e.g., food delivery), if breaks are too short, or if the amount of work is unpredictable (e.g., high-skilled crowdwork; Eurofound, 2018b).

The study of Urzì Brancati et al. (2020) shows that 50% of platform workers experience stress at work. Broughton et al. (2018) point out that some platform workers are stressed by not knowing their schedule, the type of work, or their earnings for the next week. Furthermore, stress may arise when platform workers live with the constant fear of bad ratings (Huws et al., 2019). As pointed out above, platform workers mostly highlight the benefit of working from home. However, working from home might also lead to social isolation (Graham et al., 2017). Huws et al. (2016) argue that crowdworkers in particular may experience increased psychological stress caused by a lack of support and social isolation, the geographical distance to the client, and the absence of colleagues.

Safety and Health Risks Safety and health risks vary considerably across the different types of work. Platform workers who perform online tasks and work mainly at home (crowdworkers) mention long periods of sitting and spending long hours in front of the screen as a health risk (Huws et al., 2017). Huws et al. (2016) emphasize that workplaces that do not meet ergonomic standards and the non-use of preventive medical examinations (e.g., eye tests) might be a health risk in crowdwork. Overall, however, health risks are more likely to be reported by platform workers engaged in outdoor tasks (e.g., physically strenuous work, traffic accidents, suspicious types of offers, attacks and harassment by clients; Broughton et al., 2018; Huws et al., 2016, 2017). The study of Urzì Brancati et al. (2020) also highlights the different health risks associated with different types of platform work. In total, 47% report that their work involves health or safety risks – ranging from 34% among platform workers with online micro tasks to 54% among workers with online professional services. Eurofound emphasizes that the physical environment in platform work hardly differs from comparable work environments in the traditional economy. However, the responsibilities for ensuring the physical health and safety of platform workers are often unclear given the ambiguous employment status of workers. This can become especially problematic if platforms use the pay-by-task mechanism and if tasks are primarily performed quickly and with insufficient care (Eurofound, 2019).

Job Satisfaction In the study of Broughton et al. (2018), crowdworkers in particular are highly satisfied with their working conditions. Working in their home

environment, they believe it is their own responsibility to change things (e.g., office equipment, work environment) if they are not appropriate. In addition, other studies indicate that platform workers are generally satisfied with their work (Leimeister et al., 2016b; Bertschek et al., 2015; Serfling, 2018). However, there are also indications of dissatisfaction among platform workers with regard to the predictability of work and their income (Bertschek et al., 2015; Berg, 2016).

Overall, it is evident that platform work is associated with a high degree of flexibility. Platform workers also appear to be predominantly satisfied with their work. However, there are also some negative aspects, such as a fast work pace, lack of predictability, low income, or the importance of ratings. The actual working conditions also depend on the platform under consideration and the specific type of task. Furthermore, Pesole et al. (2018) indicate that the negative conditions increase with the amount of platform work.

4.3 Comparison with Other Employees

The study by Huws et al. (2017) reveals some similarities between platform workers and non-platform workers regarding work-related electronic communications from home or the use of digital apps for workflow management and reporting. However, this study does not allow for comparing the job quality (e.g., physical workload, working intensity, or job autonomy) of platform workers and non-platform workers.

To get a better insight into how the work situation and the job quality of platform and crowdworkers differs from that of other employees who also work extensively with digital media (i.e., desktop PC, laptop, or tablet PC) but not on platforms, we draw on 9382 employed individuals in the BAuA-Working Time Survey 2019 (Häring et al., 2020). Specifically, we compare solo self-employed workers using ICT (3%, n = 307) to employees using ICT (75%, n = 7,053). For comparison, we also include the group of (self-)employed individuals not using ICT at work (18%, n = 1724). Overall, the group of ICT-using solo self-employed individuals identified in the data is similar in various sociodemographic characteristics to the group of platform workers and crowdworkers described in previous studies. The group of solo self-employed individuals using ICT mainly consists of well-educated men, a high proportion of whom only work few hours per week and have a rather low income.

Table 3 summarizes the prevalence of certain working conditions across the three different groups. As expected, individuals using ICT at work seem to perform physically demanding tasks (19%) less often than workers not using ICT at work (53%). Regarding work intensity, multitasking seems to be especially common among individuals using ICT. In accordance with the results of previous studies, individuals doing digital work and solo self-employed individuals in particular seem to have a higher level of job autonomy. However, solo self-employed individuals are also more often confronted with blurring boundaries, long hours, and non-standard

schedules. This is also reflected in the increased frequency of being contacted in private life for work-related reasons. Interestingly, there are hardly any differences in the ability to detach from work across the three groups (42–45%). As indicated by the previous studies, solo self-employed individuals on average also report somewhat better health outcomes, higher job satisfaction, and higher satisfaction with the compatibility of private life and work.

5 Conclusion

This chapter took a detailed look at the phenomenon of platform work and crowdwork. Specifically, we tried to assess the prevalence of platform work, the characteristics of platform workers and the typical working conditions related to platform work. On the one hand, existing studies provide rather clear answers, although some evidence is still ambiguous and requires further research. For instance, it is apparent that it is difficult to precisely estimate the distribution of platform work and crowdwork based on the available database. The values range from 8% to 28%, depending on the country (crowdwork: 3–14%). Given the methodological heterogeneity of the studies, it is reasonable to assume that platform work is not such a widespread phenomenon at this point. However, the proportion of platform workers may increase as a result of certain developments such as new technologies, new product ideas, or calls for even more flexibility among employees and companies. In contrast, the studies uniformly indicate that platform workers tend to be male, younger (<35 years), and highly educated. With regard to employment status, platform workers are mostly employees in their main job, pursuing platform work as a secondary occupation. The platform work itself is based on self-employment. The income earned through the platforms also indicates that platform work tends to be performed as a sideline, with the largest proportion of platform workers generating a maximum of 25% of their income via platforms.

With regard to the work situation of platform workers, the studies suggest that platform work is related to certain advantages and disadvantages, which may vary by type of platform work (e.g., crowdwork or gig work), type of platform, country, and the individual's personal circumstances. In general, the advantages include a high degree of flexibility in terms of time and place, autonomy, or a better balance between work and private life for employees. Because of its flexibility and independence from the local labor market, platform work, and especially crowdwork, also creates access to work for people who would otherwise likely be excluded. Disadvantages include blurring boundaries, a high amount of unpaid work, lack of social protection, and social isolation.

Furthermore, it becomes clear that there are similarities in the work situation of platform workers and other employees who also work extensively with digital media (regarding e.g., flexibility, autonomy, work-life balance, blurring boundaries, or low income). As the special feature of platform work and crowdwork is that the work is organized entirely online according to the rules of an Internet platform,

Table 3 Working conditions of solo self-employed individuals and employees using ICT in comparison to non-ICT users

		ICT use		No ICT use	Total
		Solo self-employed	Employed		
Work intensity	High deadline or performance pressure[1]	39%	47%	38%	46%
	Multitasking[1]	42%	39%	27%	37%
	Working very quickly[1]	32%	47%	49%	47%
	Interruptions[1]	23%	55%	31%	49%
Temporal boundarylessness	Long working hours (at least 48 hours per week)	27%	12%	14%	14%
	Contacted in private life for work-related reasons[1]	31%	11%	10%	12%
	Weekend work (at least once a month)	80%	38%	54%	43%
	Atypical working hours (outside 7am to 7pm)	19%	19%	31%	21%
Job autonomy	Work is stipulated in the minutest details[1]	.	24%	34%	25%
	Ability to plan and schedule work[1]	92%	78%	56%	75%
	Influence on assigned workload[1]	72%	35%	24%	35%
Detachment	Ability to detach from work	42%	45%	43%	44%
Physical workload	Physically demanding work tasks[2]	19%	19%	53%	26%
Well-being	Scheduling of working hours allowances private life[3]	67%	62%	56%	61%
	(Very) good general state of health[4]	77%	72%	55%	70%
	(Very) satisfied overall with work[5]	97%	93%	91%	93%
	(Very) satisfied with how work life and personal life fit together[5]	85%	80%	81%	81%

Data: BAuA-Working Time Survey 2019 ($8872 \leq n \leq 9348$)

[1]Scale: "often," "rarely," "sometimes," and "never"; percentages correspond to the share of "often" (vs. "rarely," "sometimes," and "never")

[2]Items "lifting and carrying heavy loads" and "working in a bent, squatting, kneeling or recumbent position, working overhead" were combined. Scale: "often," "rarely," "sometimes," "never"; percentage corresponds to share of "often" in at least one of the two items (vs. "rarely," "sometimes," and "never" in both items)

[3]Item "In the scheduling of working hours, I manage to make allowances for family and private interests" scale ranges from 1 "strongly agree" to 5 "strongly disagree"; percentages correspond to 1–2 "(strongly) agree" (vs. 3–5 "partly," "(strongly) disagree")

(continued)

Table 3 (continued)

[4]General state of health scale: 1 "very good" to 5 "very bad"; percentages correspond to 1–2 "(very) good" (vs. 3–5 "partly," "bad," "very bad")

[5]Overall work satisfaction scale: "very satisfied," "satisfied," "somewhat satisfied," and "not satisfied at all"; percentages correspond to "very satisfied" and "satisfied" (vs. "somewhat satisfied" and "not satisfied at all")

·Sample size too small, n (unweighted) < 30

platform work is also accompanied by very specific conditions (e.g., anonymity, monitoring, rating systems, or specific channels for communicating with the platforms). Furthermore, the flexibility of platform workers may also be limited by the platforms' specific work organization, making it unclear whether it is the employees who gain flexibility or rather the clients. Furthermore, using the example of people with disabilities, Frieß & Nowak (2021) point out that the specific work organization on platforms can also exclude people from this work.

It also remains unclear whether the COVID-19 pandemic will have a lasting impact on platform work. Given the diversity of platform work, different effects can be expected. On the one hand, we see that food delivery platforms play an important role during lockdown periods, providing essential services to consumers (Rani & Dhir, 2020). Accordingly, the Online Labour Index also suggests an increase in crowdwork. On the other hand, platform workers working in passenger transport or household services, for example, experienced a decrease in work and thus also in income (Eurofound, 2020). In general, the uncertainties in platform work are also growing. During the COVID-19 pandemic, there is stronger fluctuation in job availability for platform workers (Online Labour Index). Whereas crowdworkers can work safely from home, location-based platform workers, such as delivery service workers or cab drivers, are at a particular risk because they cannot always ensure social distance (Rani & Dhir, 2020).

Taken as a whole, it becomes apparent that platform work is associated with both opportunities and risks for employees and presents a challenge for the safe and healthy organization of work. First research has ignited a debate about the needs for regulating platform work. In the future, platform workers, platform owners, unions, and policymakers must continue their conversations and address important questions regarding the safety and health of platform workers, including social protection, minimum wages, and psychological and physical well-being.

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