Algorithmic Integration and Precarious (Dis)Obedience: On the Co-Constiution of Migration Regime and Workplace Regime in Digitalised Manufacturing and Logistics

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Abstract
This article analyses the interaction of the algorithmic workplace regime and the migration regime in manual work in platform logistics and manufacturing in Germany. Based on ethnographic case studies, the article reconstructs how companies integrate migrant workers by using systems of algorithmic work control. These simplify the labour process and direct workers without relying on a certain language. Algorithmic work control, however, does not realise its intended disciplining effects on its own but is dependent on external factors. A precarious residence status is such an external disciplining factor as it can create an implicit alliance of migrant workers with their employers in the hope for permanent residence. Nonetheless, the interaction of the two regimes also produced new forms of solidarity between the workers, which in some cases led to new forms of self-organisation. Thus, workplace regime and migration regime co-constitute each other.

Keywords
algorithmic control, digitalisation, ethnography, Germany, logistics, manufacturing, migration regime, platform work, workplace regime

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Introduction

Algorithmic work control – the direction and evaluation of labour processes through apps, digitalised production infrastructures or so-called ‘wearables’ – has received a lot of scholarly attention. The fast-growing body of literature on this phenomenon starts from the observation of the ubiquity of computing in nearly all forms of work – which goes along with a ubiquity of tracking and surveillance (e.g. Zuboff, 2019). The vast majority of empirical studies on algorithmic work control draws on cases from the so-called ‘gig economy’ (Woodcock and Graham, 2020) or ‘platform economy’ (Srnicek, 2016), which typically mediates between demand and supply of pseudo-independent contract workers (Altenried, 2019; Cant, 2019; Ivanova et al., 2018; Rosenblat, 2018; Veen et al., 2019). Although there are no official employment figures on the platform industry, preliminary findings suggest that the majority of workers are migrants¹ (Van Doorn et al., 2020). This applies both to countries of the global North, such as Germany, which is the focus of this article (Fairwork, 2020: 7), and to countries of the global South (Anwar and Graham, 2021). Nevertheless, empirical studies on the relationship between algorithmic workplace regimes and migration regimes are lacking. Existing research mostly focuses on the interaction of migrant labour and digitalisation on the level of the labour market and state regulations (e.g. Biagi et al., 2018; Fuchs et al., 2019), while, especially for the case of Germany, the level of the labour process is not taken into account. Focusing only on the question of migrant access to labour markets leaves out questions of the form and quality of migrant labour. In this context, the dimension of organisational and technical control of the labour process functions as the necessary complement of state regulations (Birke et al., 2017; Nobil Ahmad, 2008).

This article therefore examines the interaction of the algorithmic workplace regime and the migration regime in Germany to enable new insights into both algorithmic work control and migration control that are inhibited by an isolated analysis of each. Firstly, this integrated perspective can demonstrate that precarious employment of migrants does not only depend on certain forms of migration regulation (as has been established repeatedly; see Anderson, 2010; Bauder, 2006; Könönen, 2019; Mezzadra and Neilson, 2013) but also on certain technical and organisational preconditions at the level of the labour process. Thus, in the cases researched here, algorithmic work control enabled the companies to integrate migrant workers in the first place as it overcame language barriers and allowed for a deskilling of certain tasks. Secondly, the integrated perspective allows for new insights into the functioning of control in digitalised workplaces. Most studies on digitalised labour focus on digital surveillance as the central means for organisational control, underestimating the need for other control mechanisms to ensure that workers react to the self-optimisation imperatives of automated digital feedback at all. The empirical data presented here show that a precarious residence status is an important motivational factor for compliance in algorithmic workplace regimes.

The first section of the article briefly reconstructs the notions of migration regime and workplace regime to argue for an integrated perspective. The consecutive section elaborates on the case study, which consists of four focus cases, for which companies were selected that have a high share of migrants among their workforce and use systems of algorithmic work control. Two of these companies are platform-based delivery
companies and two are manufacturing companies of the so-called ‘Industrie 4.0’. The third section examines the effects of the interaction between an algorithmic workplace regime and the German migration regime on employment. It demonstrates how the entanglement of the two is used by the companies researched here to integrate a cheap and flexibly deployable migrant workforce. Subsequently, the fourth section examines the effects of the interaction between an algorithmic workplace regime and the German migration regime on relations of control within companies. On the one hand, a precarious residence status increases the likelihood of workers to respond to automatic feedback of algorithmic control systems; on the other hand, commonalities with regard to the precarious residence status and the digitally controlled labour process turned into a basis for the workers to organise for better working conditions.

**Migration regime and workplace regime**

‘Regime’ is one of the most often used concepts in critical sociology, referring – with varying emphasis – to a set of power relations that restrict certain actions and enable others. A regime is the result of strategies of domination as well as resistance (Burawoy, 1985; Mezzadra and Neilson, 2013). Therefore, empirical analysis must include forms of solidarity and power ‘from below’. ‘Migration regime’ is probably leading the long list of ‘regime’ composites, with thousands of publications that carry the term in their title (for an overview, see Rass and Wolff, 2018). The debate on migration regimes is based on two main topics: citizenship and labour markets. The debate on citizenship centres on issues of exclusion of migrants from social rights (e.g. Castles and Davidson, 2005; Isin and Nyers, 2014; Turner, 2016); the debate on labour markets centres on the effects of migration on the constitution of the working class and the division of labour (e.g. Bauder, 2006; Goldring and Landolt, 2011; Mezzadra and Neilson, 2013). The strength of the term ‘migration regime’ lies in emphasising the productive rather than only the restrictive aspect of migration control. The regulation of migration is therefore one of the central governmental devices for shaping labour markets.

Thus, migration regimes in the global North are usually defined by the need for specialists on the one hand and cheap labour on the other (Anderson, 2010; Bauder, 2006). In this sense, German employer associations have long been complaining about a lack of skilled workers. One study assumes that there will be an annual immigration requirement of 400,000 workers over the next 30 years in order to stabilise employment potential at current levels (Fuchs et al., 2019). Consequently, the ‘Specialist Immigration Act’ became effective in March 2020 to facilitate the immigration of skilled labour. At the same time, however, migration is also seen as a possible solution to the need for cheap, low-skilled labour. Therefore, employers aim to extend the liberal regulations on labour immigration beyond the segment of highly skilled workers (Fuchs et al., 2019). The German Employers’ Association wanted to draw on refugees, calling for them to ‘start integration into the labour market quickly’ and to abolish bureaucratic hurdles such as the priority check (BDA, 2020). Notwithstanding their stance on the liberalisation of access to the labour market for refugees, employers argued for maintaining precisely those regulations which keep their residence status precarious (BDA, 2020). A step in this direction has already been taken in 2016 when the ‘Integration Act’ was passed. On
the one hand, this law facilitates access to employment for many refugees, but on the other hand also forges a link between residence rights and the obligation to take up employment. As a result, the number and proportion of migrants from non-European countries registered as employed increased, but almost exclusively in sectors known for the exploitation of cheap labour (Birke and Bluhm, 2020). Persons seeking asylum in Europe even report experiences of forced labour (Dwyer et al., 2016). More generally, Germany, like other countries of the global North, has developed a wide differentiation of residence statuses and very high barriers to naturalisation. Thus, migration regimes are not just about entry controls but also create an internal ‘multiplication of labour’ (Mezzadra and Neilson, 2013) or ‘juridical division of labour’ (Könönen, 2019) which restricts who can get what job. Consequentially, the chance of non-European migrants in Germany to be in atypical employment is nearly doubled compared to natives (Seils and Baumann, 2019: 5). Moreover, certain residence statuses are coupled to an existing employment which exerts further pressure, especially on refugees, to endure various forms of over-exploitation (Berntsen, 2016; Kalbermatter, 2020; MacKenzie and Forde, 2009). Generally, the developments in the German migration regime reflect a global shift from a liberal (Freeman, 1995; Joppke, 1999) to a market-oriented regime (Boucher and Gest, 2018). Even though Boucher and Gest classify the German migration regime as an intra-union regime characterised mainly by EU regulations, it is increasingly approximating the neoliberal regime, which they attribute to countries such as the UK, Canada or Switzerland.

The migration regime is deeply embedded into economic politics, ranging from fiscal policy (Hansen, 2021) to a ‘politics of production’ (Burawoy, 1985). Following Burawoy, politics of production are always an entanglement of state regulations and politics on the level of the labour process. The term ‘labour regime’ or ‘workplace regime’ is applied in a similar variety of ways as the term ‘migration regime’ (for an overview, see Thompson and van den Broek, 2010). The term emerged from the observation that capitalist production always requires control and domination, typically of managers over workers, in order to guarantee the realisation of labour power. This control, however, materialises in a variety of forms dependent on the particular power relations between the actors (Edwards, 1979). The most influential version of the concept is Burawoy’s (1985) formulation of the ‘factory regime’ as a balance of consensual-hegemonic as well as despotic elements of control over the labour process. His version of the concept is especially fruitful for analyses of the interaction between state regulations and labour process. On the level of the labour process, aspects of algorithmic control have received much attention in current debates about workplace regimes (Altenried, 2019; Cant, 2019; Ivanova et al., 2018; Rosenblat, 2018; Veen et al., 2019). The consensus of these studies is that algorithmic work control fosters the precarious employment relations of the gig economy, as it enables an organisational and spatial decoupling of workers from companies, while at the same time maintaining a relationship of close control. More generally, algorithmic work control is found to enable regimes of ‘panoptic’ (Woodcock, 2020) or ‘cybernetic’ (Schaupp and Diab, 2020) control. Here, the different forms of algorithmic work control will be summarised under the term ‘algorithmic workplace regime’.

There are various accounts on how migration regimes are influenced by digital technologies to foster surveillance and control but also as part of resistant practices (for an
overview, see Nedelcu and Soysüren, 2020). Yet, the interaction of these algorithmic workplace regimes with migration regimes has not been systematically analysed, even though, from the perspective of a politics of production, they ought to be understood as deeply entangled. In this sense, the concept of a ‘multiplication of labour’ (Mezzadra and Neilson, 2013, 2019) offers a fruitful analytical framework as it shows that borders function not only as institutions of exclusion but also of selective inclusion, primarily following the needs of local capital. Thus, it connects migration regimes to workplace regimes ‘in terms of their consequences for the subjective composition of living labor’ (Mezzadra and Neilson, 2013: 22).

Like Burawoy’s (1985) concept of the production regime, Mezzadra and Neilson make far-reaching claims about the global relations of capital and labour. In contrast to Burawoy, they do so not by analyses of concrete labour processes but of ‘the operations of capital’ (Mezzadra and Neilson, 2019) on a global scale. However, from the perspective of labour process analysis, it is not possible to conclude the subjective composition of living labour from managerial or governmental strategies – let alone ‘operations of capital’ (Thompson and Vincent, 2010). It might be useful to scale down claims from a global level to concrete labour processes and policies to account for the wide variety of regimes and their specific contradictions. Therefore, this article focuses on two very specific workplace regimes, namely (1) algorithmic control of manual work in manufacturing and platform logistics and (2) German migration policies. Of course, at the level of the labour process as well as the labour market, there are other important regimes as well; but taking a closer look at those two very specific regimes makes it possible to research their co-constitution empirically.

The case study

This article builds on a multi-case study (Yin, 2003) of digitalised manufacturing and logistics in Germany that was conducted through 2017–19 (see also Schaupp, 2021b). The study consists of 53 qualitative interviews (I#1–53) and participant observations in four different companies (PO#1–9) which function as focus cases. These cases were selected with regard to the theoretical criterion of a combination of algorithmic work control and migrant labour. Algorithmic work control is widespread in the so-called platform economy, especially in delivery logistics (Altenried, 2019; Veen et al., 2019). Moreover, in platform companies, the share of migrants is very high (Van Doorn et al., 2020). However, algorithmic work control also occurs in other economic sectors, especially in industrial manufacturing or ‘Industrie 4.0’ (Hirsch-Kreinsen et al., 2018; Schaupp and Diab, 2020). This has largely been neglected in existing research due to the heavy focus on platform work. Digitalised manufacturing also has a high share of migrant employment with about one-fourth of all workers being non-Germans (Biagi et al., 2018; Statistisches Bundesamt [Destatis], 2019).

Based on these criteria, the sectors of platform delivery logistics and ‘Industrie 4.0’ were selected as the focus for the case studies. In these fields, comprehensive interviews (Kaufmann, 2011) were conducted with managers, works councils, technology developers, trade unionists and workers to identify strategies for dealing with algorithmic work control. Seven of the interviewed workers were migrants with different residence
statuses. They had Dutch, Romanian, Turkish, Chilean, Indian, Libyan and Moroccan nationality. The first informants were selected based on recommendations of experts such as engineering scientists and trade unionists. Those were then asked for other relevant actors in the field, following a snowball-system (Noy, 2008). On average, the interviews took one hour. According to the strategy of the comprehensive interview, the informants were asked three general questions on the effects of algorithmic work control in their companies. Subsequently, follow-up questions were asked to deepen relevant aspects of the interviewees’ narratives.

Based on these interviews and previous theoretical considerations, four companies were selected as focus cases. The first, which will be called Smart Solutions, is a large corporation in the chemical industry with a medium level of work qualification. It was selected because it was a typical large industrial corporation with an average share of migrant workers (about 20% on the shop floor) and had just invested in digital infrastructure. The second, Smart Electrics, is a medium-sized mechanical engineering company in which the shop floor workforce is largely composed of highly qualified technicians. It was selected because it was just beginning to implement algorithmic work control and managers also reported that they wanted to shift some jobs to migrant workers (I#1, #7). Besides these ‘Industrie 4.0’ cases, two delivery logistics companies were selected. Smart Shopping, a multinational online retailer with several warehouses in Germany, was chosen as the third focus case, as it offered the opportunity to study the algorithmically controlled ‘low-skilled’ work of pickers and packers in the warehouses. For some warehouses, the percentage of migrant workers among the staff was reported to be up to 70, many of them in pending asylum cases (I#42, #51). The fourth focus case is Smart Delivery, a logistics company that delivers meals from independent restaurants to consumers via bicycle couriers. Workers are controlled algorithmically without any necessary personal contact to superiors. This company was selected as it employs a high share of migrants and is considered to be among the avant-garde of algorithmic management (Cant, 2019; Ivanova et al., 2018; Leonardi et al., 2019). The online appendix contains a detailed table on the features of the focus cases.

All four focus cases were investigated using a combination of comprehensive interviews and participant observation. Since interviews do not allow for conclusions about the actual use of technology, this must be analysed ethnographically. For this reason, the author worked at Smart Electrics and Smart Delivery to conduct participant observations (Burawoy, 2009). At Smart Electrics, this was limited to two one-week work assignments before and after the implementation of a digital work control system (PO#2, #4). At Smart Delivery, it took the form of a five-month employment as a mini-jobber (PO#5). At Smart Solutions (PO#1, #3, #7, #8) and Smart Shopping (PO#6, #9), participant observations were conducted at a series of multi-day works council workshops on the topic of digitalisation of production. Audio records were made on most parts of these workshops and supplemented by written field notes. Of the 53 interviews, 32 belong to the focus cases. In total, representatives of 18 organisations had their say in the interviews. This ensures the external validity of the findings from the focus cases. The collected data were analysed according to the dual thematic framework analysis (Kalbermatter, 2020), which aims to combine data from ethnographies and interviews.
and to contrast conflicting perspectives on the same subject. The different methodological approaches are thus linked both in data analysis and in theoretical reflection.

Deskilled algorithmic integration

For the managers interviewed in the case study, the most important motivation for the employment of migrants was to access a new pool of cheap labour. In the face of low unemployment rates, the manager of Smart Electrics stated: ‘We need a base of many low-qualified people’ (I#7). To achieve this, the researched companies made use of the juridical division of labour resulting from the various residence statuses of the German migration regime. For example, works council members at Smart Shopping reported on agreements between the company and local authorities to provide refugees directly from asylum centres:

There was a refugee camp somewhere nearby, and they went to the mayor and talked to him: If the prohibition to work would be suspended for those refugees, we could employ them. Smart Shopping employed 700 or so people from the refugee camp. [. . .] [They] even organised buses which picked up the refugees directly at the camp. They worked at Smart Shopping and were brought back after work. (I#51)

Similar events seem to have happened at another location:

The rescue for Smart Shopping was that asylum seekers came to Germany. A large part of the temporary workforce are asylum seekers. Those who have been given a work permit, they work for us. They are grateful, first of all that they get a job, that they earn money. And then they’re brought to the store like lambs, and Smart Shopping is happy. (I#42)

Consequentially, a team leader explained that ‘about 70%’ of the people working on his shift were asylum seekers (I#42). They were granted a work permit only valid for Smart Shopping. In this way, migration regulation created an influx of cheap labour. Nevertheless, these arrangements appear to be based primarily on local agreements between companies and communal administrations.

Still, the integration of (unskilled) migrant labour depends on certain preconditions of the labour process which are often overlooked in existing research. In the cases examined here, these preconditions manifested primarily in digital systems of work control which gave detailed instructions to the workers. The manager of Smart Electrics said, the aim of the system is ‘either to make things go faster or to enable people with less qualifications to do it’ (I#1).

At Smart Shopping, the labour process was controlled by a handheld digital scanner with a display. A worker explained: ‘I can’t make any decisions for myself. The scanner tells me: go right or go left. The scanner tells me: now do not work, now work faster’ (I#45). A central objective of algorithmic work control was thus to standardise the labour process but also to include migrant workers more easily. A works council member at Smart Shopping explained: ‘They no longer have to speak German. It’s enough if they speak English and meanwhile also Arabic’ (I#51).
At Smart Delivery, an app on the couriers’ private smartphones instructed them exactly where to go and what to do. This app-based system made it possible to replace personal training of the couriers by an online group videoconference. A so-called ‘Rider Captain’ explained that because of the simplicity of the labour process, ‘the Smart Delivery principle’ is ‘to hire anyone’ (I#36). This, in most cases, meant hiring migrant workers. Owing to an automated online job application process, no knowledge of the local labour market or personal ties were required to get the job at Smart Delivery, which makes it easier for migrants to apply. The most important point is that digital assistance systems can overcome language barriers of the labour process. Thus, the app can be configured to various languages and couriers communicate in English (PO#5). Consequently, at the location of the participant observation, about 70% of the couriers were non-Germans with a majority of non-European migrants (PO#5).

In the manufacturing cases, the proportion of migrant workers is much lower than in the platform logistics cases, but the interviewed managers explicitly spoke of wanting to make greater use of migrant workers in the course of implementing algorithmic work control. To achieve this, the management at Smart Electrics ordered skilled production workers to program their knowledge into the work control systems. Through a software, workers had to put descriptions or pictures of their labour process into the system. The objective was that the instructions had to be detailed enough to allow ‘any random person’ to carry out the assembly process (PO#2). Management thought of this process explicitly as a struggle over the knowledge of the employees, explaining the workers’ reluctance like this: ‘I’m siphoning off his knowledge. He is replaceable now’ (I#1). Finally, as a result of the now simplified work, management declared that they wanted to change their recruitment strategy: ‘We are really shifting work to [. . .] less qualified and therefore cheaper workers’ (I#7). These cheaper workers were primarily migrants: ‘We have now hired a Romanian in the incoming goods department who speaks poor German, but he has to do qualified work. He will now get his instructions in Romanian, with a picture’ (I#7). It would also be conceivable, he added, to dispense with linguistic instructions completely and switch to a purely pictorial presentation. The integration of cheap migrant workers was explicitly seen as a turn away from costly automation and towards cheap manual labour. The manager explained: ‘Why have we automated everything? Because our employees are too expensive.’ Now that he had access to cheaper workers, he could ‘make them do it manually’ (I#7). While existing literature has shown how cheap labour can slow or even reverse technological innovation (Abel et al., 2014), in this case, labour is both cheap and controlled by new technology.

In addition to the division in terms of residence status, the cases researched here also show a division and precarisation of the employment status. Precarious working conditions seem to be typical for the platform economy with its various forms of bogus self-employment (Woodcock and Graham, 2020). Beyond the platform economy, temporary employment is the norm in algorithmically controlled manual work, as was the case in the companies researched here. Consequently, in the two logistics cases, the turnover was very high. The ‘Rider Captain’ at Smart Delivery estimated the average duration of employment at his location to be three months (I#36). At Smart Shopping, high turnover is wilfully accepted as well, in favour of low labour costs (I#43). This is enabled by algorithmic work control, which dramatically lowers the costs for training new workers.
At Smart Shopping, algorithmic work control allowed for the reduction of on-the-job training to one and a half days, a team leader explained (I#43). At Smart Electrics, production was made more flexible because algorithmic work control allows for shifting workers between different working stations without further training (I#7). At Smart Delivery, training was completely replaced by algorithmic work control. Additionally, the application process was automated via a website, which further lowers the search costs for the company (PO#2). Works council members at Smart Solutions reported that even in their industrial workplaces, tasks are increasingly outsourced to ‘freelancers’ via digital platforms (I#12, #17). In general, they reported a precarisation of employment in connection to algorithmic work control (I#11, #17, PO#1, #3). In all cases, algorithmic work control enabled the companies to decrease the contractual commitment to their workforce while still maintaining control over their labour process. This means that personnel can be deployed flexibly according to market fluctuations. On the side of the workers, however, a loss of flexibility must be expected, because they have to adapt to varying schedules, as an industrial psychologist involved in the implementation of a digital work control system admitted (I#15).

Thus, juridical division of labour and flexibilisation are not just two separate forms of precarisation of workers’ statuses. Instead, they seem to co-constitute each other. Thus, the availability of migrant labour sustains and extends ‘flexible’ labour market structures at the bottom of the labour market (Goldring and Landolt, 2011; McCollum and Findlay, 2015). Yet, the availability of migrant workers alone, however, cannot ensure flexible employment but is dependent on technical and organisational preconditions of the labour process. Thus, algorithmic work control fosters both the integration of migrant workers and the flexibilisation of the deployment of the workforce.

In the cases researched here, the digital integration of migrant workers was connected to a process of deskilling (i.e. managerial methods of expropriating production knowledge from workers). This started with ‘siphoning off’ (I#1) the knowledge of skilled workers into digital control systems and then shifting the corresponding jobs to unskilled migrant workers. Also, for the migrant workers themselves, the algorithmically controlled labour process constituted a form of deskilling in relation to their qualification and previous jobs. As one of the couriers at Smart Delivery explained: ‘I actually worked in Santiago for seven years as an engineer. And here it was a bit difficult to find a job because of the language’ (I#31). This is not an exception for migrant workers employed in Germany and especially common for refugees: 81% of refugees with expert qualifications and 45% of those with specialist qualifications are employed below their level of qualification (DGB, 2019).

Thus, the interaction of algorithmic work control and migration regimes is an important factor to consider in the ongoing debate about skills in digital labour. Studies on the German labour market have found that digitalisation does not lower the overall demand for low-skilled labour (Hirsch-Kreinsen et al., 2018; Zika et al., 2018). Rather, it seems that digitalisation has a polarising effect on skills and wages (Autor and Dorn, 2013; Goos and Manning, 2007; Staab and Prediger, 2019). Job upgrading mainly affects those who program and control digital systems. On the ‘other side’ of the algorithm (i.e. in the case of manual work in manufacturing and logistics examined here), devaluation trends can be observed in connection with algorithmic work control (Schaupp, 2021a).
especially the case for migrant workers. Thus, the share of migrants in the European labour market is constantly the highest in specifically those jobs that are the most standardised and repetitive (Biagi et al., 2018). This polarisation seems to be self-reinforcing as the growing price difference between high- and low-skilled labour makes it even more attractive for companies such as Smart Electrics to use deskilling strategies. In terms of employment, the interaction of algorithmic workplace regimes and migration regimes based on a juridical division of labour contribute to the emergence of a new lower class. However, the interaction of the two regimes also strongly affects relations of control and resistance within the companies, as the next section will show.

**Precarious (dis)obedience**

In all cases, algorithmic work control systems did not only give instructions but also tracked the performance of the workers. The system at Smart Electrics counted the seconds between the completion of each working step. At Smart Delivery, the app monitored the behaviour of the couriers via GPS; these monitoring data were used to automatically create performance profiles of the workers. The couriers assumed that these profiles formed the basis for the decision on whether their employment was continued after their fixed-term contract (PO#5). However, digital surveillance was most extreme at Smart Shopping. The handheld scanners monitored all movements of the workers. One worker explained: ‘They can see every step you take. So, they can see where you are, how much you are working, how much you are doing, how often you are doing nothing or when you went to the toilet’ (I#45). The collected data were then used to generate automatic feedback to the workers. At Smart Delivery, the app made a sound or an automatic phone call to the couriers when their performance dropped (PO#5). At Smart Solutions, production machines automatically measured the utilisation of the human labour capacity. If it dropped below 80%, the workers were automatically assigned additional tasks (I#20). At Smart Electrics, the control systems displayed the workers’ current speed in comparison to the average. This was supposed to make the workers ‘tune themselves’, as one manager put it (I#7). In the cases researched here, the objective of digital tracking was an intensification of work in the sense of speeding up working steps or reducing idle time. In most cases, this intensification was based less on control via human management but followed a model of automatic feedback that can be described as a cybernetic mode of control (Schaupp and Diab, 2020). While many studies overestimate the viability of algorithmic work control, in reality, most of these systems mainly create ‘illusions of control’ (Woodcock, 2020). Consequentially, they depend on external factors to ensure the cooperation of the workers in responding to ‘feedback’. Precarious residence status can contribute heavily to create such cooperation. The resulting obedience was emphasised positively by human resource managers interviewed here. For example, a manager at Smart Electrics described that non-Germans were ‘not at all afraid of control’ and ‘we Germans are much worse’ (I#1). A ‘Rider Captain’ at Smart Delivery explained: ‘If there are problems, it’s usually the Germans’ (I#36). Refugees are in a particularly difficult situation and would be more likely to obey. ‘They are growing to be the managers’ favourites, because they do everything’, as a works council member, a migrant originally from Morocco himself, put it. This also
contributed to a racialised division of labour within the warehouse: ‘The whites do this, the others do that. [. . .] Then you notice the difference: one sweeps and the other sits and watches. And that’s pretty weird, damn it’ (I#51). This in turn, in addition to language and cultural barriers, sometimes led to an alienation of migrants from German workers, who blamed them for deteriorating working conditions: ‘There are already conflicts between the other colleagues, because they say: “Look, he does everything, he lets everything be done to him”’ (I#51). Thus, the migration regime created a juridical division of labour between natives and immigrants. However, the heterogeneity in residence status further divided the immigrants into subgroups. This is illustrated by additional explanations of the Moroccan worker: ‘If you compare those who have been here for a longer time, they still give 100%, but now, if someone is dependent on something, they give 300%’ (I#51). Therefore, immigrant workers did not form a homogenous block but were confronted with very different degrees of precarity in terms of residence status and employment (see also Mezzadra and Neilson, 2013).

One explanatory factor for this obedience of migrant workers is the weak labour union protection for migrants in precarious jobs in Germany (Pulignano et al., 2015). Another important factor is that current German migration laws couple the residence permit of some migrants to a specific employment. Such a precarious residence status can create an unequal alliance of refugees and other migrants with their employers in the hope for permanent residence (see also Kalbermatter, 2020). This can turn into an important motivation for workers to ‘tune themselves’ (I#7) in response to the feedback of algorithmic management. However, in some of the cases researched here, migrants also managed to build up ‘cultures of solidarity’ (Fantasia, 1989) in order to resist managerial impositions.

There is a growing body of literature on workers’ resistance in algorithmically controlled labour (Cant, 2019; Leonardi et al., 2019; Woodcock and Graham, 2020). This could also be observed in the cases researched here. Workers interviewed here reported that they ‘give the finger’ to the control systems (I#45) or try to ‘outwit’ them (I#11). Informal resistant practices included various forms of micro-level ‘technopolitics’, like manipulating the algorithms or sabotaging the infrastructure, which in one case led to the abortion of the implementation of additional control technologies (Schaupp, 2021b).

An important source of solidarity was to be found in the standardised labour process itself. Most workers interviewed here reported an experience of heteronomy due to algorithmic work control. ‘I feel like a robot, I feel constantly monitored’, a manufacturing worker reported (I#11). Similar wordings recurred when the interviewed workers reported on algorithmic work control. At international meetings of union activists at Smart Shopping, it became evident that warehouse workers from Poland, France, Germany, Spain and the US shared very similar labour processes due to identical technologies of algorithmic work control (PO#6, #9). The same was reported in interviews with delegates at similar international meetings of couriers at Smart Delivery (I#49, I#50). There might even be a homogenisation of algorithmically controlled labour processes between different companies and even between different economic sectors, as workers from all four companies describe executing digital instructions as the most formative element of their work experience. The international meetings of the union activists in the platform logistics companies were used to coordinate the workers’
struggles for labour rights. At comparable international meetings of unionised workers at Smart Solutions (where there was no unified system of algorithmic work control across the different locations), this common experience of the labour process was missing and no international struggles were coordinated (PO#3). While this does not prove a causal relationship, it is at least noteworthy, as earlier research suggests that shared experiences are an important basis for resistant solidarity (Heiland and Schaupp, 2021).

In some cases, workers also turned their precarious residence status into a source of solidarity. At Smart Shopping, most migrant workers were too afraid to talk to known union activists at the workplace. However, when the activists organised external events like a soccer tournament, they were able to quickly reach many of the migrants due to the strong social integration within their ethnic communities (I#51). At Smart Delivery, migrant workers formed self-help groups to deal with residence permits and other legal issues. These ties were later also used to organise for better working conditions (PO#5). This was necessary for migrant workers because they depended more on the jobs than native workers did. Moreover, some of the migrants already had experiences with labour struggles in their country of origin, which the couriers’ self-organisation benefitted from (see also Cant, 2019). These factors led to the fact that in the grassroots union FAU, which organised many of the platform couriers in Germany, the responsibility for this field lies with the ‘foreigners section’. In both platform cases, the unions organised various forms of petitions and strike activities. While they did not succeed in stopping precarious employment practices, they were able to enforce adherence to certain labour standards at Smart Shopping and the introduction of a wear and tear payment at Smart Delivery.

These findings challenge other accounts of the emergence of solidarity in digitalised labour. Some maintain that algorithmic work control makes solidarity and resistance virtually impossible (Mahnkopf, 2019; Zuboff, 2019). Others, like Mezzadra and Neilson (2019: 82) argue that the digitalised labour process has become so ‘fragmented and elusive’ that it creates no common experience on which to ground solidarity. This seems to buy in to the managerial rhetoric of flexibility, knowledge and emotion too easily. At least the cases researched here paint a very different picture of workers’ experience and solidarity.

To sum up, in terms of control, the interaction of the algorithmic workplace regime and a migration regime based on a juridical division of labour on the one hand have led to an increased compliance of migrant workers to the digital feedback. On the other hand, informal networks of migrant workers proved to be important resources in organising for labour issues. Moreover, the common experience of an algorithmically controlled and standardised labour process seems to have contributed to building ties of solidarity between different company locations.

Conclusions

Previous studies have established that digitalisation does not reduce the overall demand for cheap labour with low levels of qualification. This might be one of the reasons why the German government has created new possibilities for the employment of refugees and other migrants. International research on migration regimes suggests that this
development might not be restricted to Germany but rather be part of a general trend towards market-oriented migration management. Thus, the juridical division of labour in Germany approximates the regimes of liberal market economies like the UK or Switzerland. However, this article has demonstrated that companies use specific technical configurations of algorithmic work control to fully exploit the potential of low-skilled migrant labour. Consequentially, it is possible to identify four specific ways in which the migration regime and the algorithmic workplace regime interact:

1. In terms of the workplace regime, algorithmic work control does not realise its intended disciplinary effects on its own but is dependent on external factors to ensure that workers respond to digital feedback. The most straightforward of such disciplinary factors is precarious employment as it increases the dependency of workers on management (Wood, 2020). Yet, a precarious residence status fulfils a similar function as it can create an implicit alliance of migrant workers with their employers in the hope for permanent residence.

2. The companies researched here are only able to integrate migrant workers by using systems of algorithmic work control. These make it possible to simplify the labour process and instruct workers without relying on the German language.

3. Vice versa, the migration regime also has an effect on the workplace regime, as new possibilities for the integration of cheap, algorithmically controlled labour keeps managers from investing in more costly automation technology. Instead, they extend their use of cheap algorithmically labour, also including non-migrants.

4. The interaction of the two regimes also produces new forms of solidarity between the workers, like self-help groups for dealing with migration authorities. These non-work-related networks then strengthen attempts to organise for better working conditions.

The findings confirm some aspects of previous diagnoses in international scholarship on precarisation in connection to algorithmic work control and juridical division of labour. While previous studies have focused very much on the platform economy, the present findings suggest that these trends extend to other forms of manual work. More importantly, the findings challenge the attribution of precarisation to either technology or legal regulations as such. Previous studies on algorithmic work control in the platform economy have neglected the importance of migration – which is indicated by the sheer number of migrant workers in this sector alone. Likewise, studies on the effects of migration regimes largely neglect the technical preconditions at the level of the labour process for the integration of migrant workers. The data collected here show that migration regime and workplace regime co-constitute each other as a politics of production in the sense that one would not be possible without the other. This interaction seems to contribute to the creation of a new class of disadvantaged workers who, however, also engage in various forms of ‘politics from below’.

Both in terms of the migration regime and in terms of the algorithmic workplace regime, the most important characteristics described here were also identified in research on other high-tech market economies. Therefore, it has to be assumed that
the interactions identified here are not restricted to the German case either but rather characterise the low-skilled part of the digital economy more generally. Therefore, the interaction between the two regimes needs to be further evaluated internationally – for example, with regard to other sectors of the digital economy and their broader social, political and economic implications.

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Notes
1. Here, the term ‘migrant workers’ is used in a narrow sense for workers without German citizenship. Most of the surveyed workers are non-Europeans. Some came to Germany as refugees and turned into labour migrants through the link between labour market participation and citizenship rights.
2. In a large-scale survey, only 18% of all employees in Germany claimed to be ‘not at all affected by the digitalisation of work’. Algorithmic work control is the form of digitalisation most frequently encountered by the respondents (Holler, 2017).
3. Works councils are institutions specific to the German model of industrial relations in which workers are granted the right to elect representatives at the company level with specific rights to information and co-determination.
4. The names of all companies in the case study were changed.
5. No other companies were contacted for the focus cases; consequently, there were no rejections.
6. Couriers in the operational service with minor staff responsibilities.
7. This also due to the specific vocational system in Germany, which is quite restrictive on the acceptance of external qualifications.
8. The international meetings at Smart Solutions and some of the meetings at Smart Delivery have been organised by a European works council.

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