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Article

Trucking (un)limited: The impact of digital platforms on labour in production networks of logistics

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Trucking (un)limited – the impact of digital platforms on labour in production networks of logistics

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Abstract: For many years, struggles over value capture have been taking place between different actors in the logistics sector, creating ever more pressure for workers in traditional activities of logistics. New actors, in the form of digital business-to-business (B2B) platforms, which are proliferating especially in the freight transport sector, are further challenging the already contested field. Based on the Global Production Networks (GPN) approach, this study addresses the question of how B2B platforms affect labour in production networks of logistics, and what labour agency practices are emerging in the face of advancing platformisation. The study draws on interviews with various actors operating in the road freight transport sector in Germany. The results show that digital B2B platforms, due to their intermediary function, have a direct impact on the inclusion and exclusion of actors involved in production networks of logistics, and induce not only a race to the bottom in terms of labour conditions, but also produce increasingly contingent geographies of logistics. This paper contributes to the literature on platforms by examining previously neglected B2B platforms and shedding light on the different ways that labour in global production networks can be affected by new agents, such as digital platforms.

Keywords: digitalisation, freight transport, Germany, Global Production Networks, intermediaries, labour agency, platformisation, subcontracting

1 Introduction

The increased emergence and growing dominance of digital platforms in various social spheres and economic sectors – often termed platformisation or the platform economy – has shaped several academic discourses in recent years (e. g., Kenney & Zysman 2016; Srnicek 2017; Lehdonvirta et al. 2020). From an economic geography perspective, the discussion revolves mainly around how capitalist relations of production manifest themselves in the platform economy and to what extent platforms are able to restructure hitherto dominant production systems (e. g., Langley & Leyshon 2017; Grabher & van Tuijl 2020; Peck & Philips 2020; Herb & Neiberger 2021). In particular, this strand of literature discusses the aspects of value, governance and power that may take new forms through the proliferation of digital platforms. While digital platforms often define themselves as mere digital mediators or enablers of interactions between different user groups, it is becoming apparent that they are actively shaping contemporary economies as “*non-neutral intermediaries*” (Grabher & van Tuijl 2020: 4).

The impact of the platform economy on labour is also examined in some rather critical geographical and social science studies. The focus is primarily on digital platforms that mediate microtasks to a crowd of more or less independent contractors – often described as the gig economy (e. g., Ettliger 2016; Graham et al. 2017). This new kind of platform-mediated work is in many cases accompanied by responsibilities and risks being transferred to workers, and their limited ability to represent their interests vis-à-vis platform operators. At the same time, platform operators can exercise control over workers and often concentrate power in production networks (Graham et al. 2017; Vallas & Schor 2020). The focus of human geography studies on platformisation and labour relations, has so far been primarily on platforms operating in urban contexts (e. g., Bauriedl & Strüver 2020; Graham 2020), and on cross-sectoral investigations of the gig economy (e. g., Wood et al. 2019; Anwar & Graham 2021). However, contextualisation of the respective industries or production networks in which digital platforms operate, is often missing. Moreover, the focus of existing studies on the effects of platformisation is

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predominantly on platforms operating in business-to-consumer (B2C) markets, while less attention has been paid to business-to-business (B2B) platforms – especially when it comes to labour aspects – although they are also gaining importance in many sectors (Grabher & van Tuijl 2020). As a result, there is a lack of deeper understanding of how production networks and the geographies of work are being transformed by the increased proliferation of digital platforms in specific contexts.

We aim to address this research gap in this paper and take into account the calls for a differentiated investigation of platform models from an geographical, labour-orientated perspective (Grabher & van Tuijl 2020; Kenney & Zysman 2020; Bearson et al. 2021). To do so, we use the logistics sector in Germany as an empirical case, specifically the road freight transport sector, where digital platforms, as in many other countries, have been proliferating since around 2015 (Oliver Wyman 2017). Our study addresses the question of how digital B2B platforms affect labour in the freight transport sector and what labour agency practices are emerging in the face of advancing platformisation. To answer the research question, interviews were conducted with representatives of platform operating firms, various transport firms as well as individual and organised worker representatives in Germany.

In our study, we consider logistics respectively logistical labour within the Global Production Network (GPN)¹ framework (e. g., Henderson et al. 2002; Coe et al. 2008) and focus on the related debates about labour agency (e. g., Coe & Jordhus-Lier 2011; Coe 2015; Cumbers 2015). The GPN approach is particularly suitable for examining the actions and relationships between actors that influence the production of certain goods or services, from a spatial perspective. It is thus a useful framework, firstly for drawing attention to the geography of labour and considering labour as an elementary component and agent in the production of goods and services (e. g., Herod 1997; Cumbers 2008; Franz 2010), and secondly for a better geographical understanding of the production-related effects and potential power imbalances brought about by digital platforms (Howson et al. 2022). By connecting digital platforms and labour within the GPN framework, the study not only contributes to the aforementioned (geographical) literature on the platform economy and platform labour by addressing up to now neglected B2B platforms, but also contributes to GPN-related research on logistical labour and labour agency (e. g., Coe & Jordhus-Lier

2011; Gutelius 2015; Newsome 2015) by examining how geographies of work are shaped by new intermediary actors, namely digital platforms. Especially in logistics, a sector already characterised by power asymmetries and precarity, the emergence of digital platforms raises the question of what consequences this development will have for the already contested field, and what implications arise in the context of labour agency and capital-labour relations in a broader sense.

The following two sections present the theoretical framework of this study: First, we present conceptual considerations on logistics and logistical labour in GPN. We then explain how platforms operate and the consequences that can be expected for labour, while also providing an insight into the conceptual considerations of labour agency from a GPN perspective. After the methods are presented, the empirical findings are explained in three sections. Following our conceptual considerations, we first discuss the role of digital platforms in production networks of logistics and the way in which they thus affect labour. We then present the actual consequences for labour conditions in the transport sector, before we discuss the development of labour agency in the context of increasing platformisation. Finally, we draw a conclusion and give an outlook on further research on platformisation from a geographical perspective.

2 Labour in production networks of logistics

Logistics – understood as “*the process of planning, implementing and managing the movement and storage of raw materials, components, finished goods and associated knowledge from the point of origin to the point of consumption*” (Coe 2014: 225) – plays a fundamental role in the global production and circulation of goods, and has therefore been of importance to the discipline of geography for many years. Logistics can be considered in two different ways within the GPN framework: logistics as a global production network in its own right, and logistics as a component in global production networks of client sectors (Coe 2014). This analytical distinction “*allows the mutual constitution of the two sets of networks and the directions of influence between them to be highlighted*” (Coe 2020: 5).

While geographic research on logistics initially focused on supply chain management perspectives, more critical geographical studies have emerged in recent years that put a greater focus on the power structures and social relations within logistics (e. g., Newsome 2015; Coe 2020;

¹ In the following we use the acronym “GPN” to refer to the GPN approach, and “global production networks” to refer to the empirical phenomenon (see Yeung & Coe 2015: 42).

Verfürth et al. 2023). One of the main topics of these studies, which mostly come from the field of political-economic geography, is labour in logistics. Based on empirical examples from warehousing, distribution, and transportation, several studies show that work in logistics is essentially characterised by power asymmetries and labour conflicts (e. g., Gutelius 2015; Gregson 2017; Jordhus-Lier et al. 2019; Fuchs et al. 2022). According to Newsome (2015: 38), a crucial reason for this is the “*battle over value capture*”, which takes place between large industry or retail firms and so-called third-party logistics providers (3PL), acting as intermediaries² between client and logistics production networks (Aoyama & Ratick 2007; Coe 2021). Those battles are leading to an increasing efficiency and cost pressure among logistics providers, and to the “*subordination of labour and work degradation*” at the end (Newsome 2015: 42). Along with this growing pressure, as well as the widespread subcontracting and interchangeability of logistics services, precarious work arrangements and segmentation of workers increase, thus reproducing the uneven geographies of capitalism (Gutelius 2015).

Intermediaries in logistics include not only 3PL but also labour market intermediaries, such as temporary staffing agencies, which are particularly common in warehouse logistics (Gutelius 2015). Gutelius (2015) uses the case of these agencies to illustrate the powerful position intermediaries can hold in GPN. By applying the disarticulation approach (Bair & Werner 2011), she shows that intermediaries play an important role in the inclusion and exclusion of actors involved in logistics, thereby affecting working conditions. This is one of the many studies that deal with the role of intermediaries in global production networks (e. g., Franz et al. 2014; Coe & Yeung 2015), and in some cases specifically take a labour perspective (e. g., Barrientos 2013; Raj-Reichert 2020). In this context, it is emphasised that intermediaries often do not play a neutral, passive role but, on the contrary, they take an active role in shaping GPN. With this in mind, the following conceptual section addresses the characteristics of digital platforms and the possibilities of labour agency.

² Coe and Yeung (2015: 49) describe the function of intermediaries as follows: “*intermediaries bridge and connect multiple actors in a global production network, allowing them to engage in value activity of mutual benefit.*”

3 Platformisation and labour agency in logistics

Technological developments and digitisation, as well as automation processes, are increasingly important for the logistics sector. As a result, a large number of new digital business models have emerged in various areas of logistics in recent years, above all digital platforms (see Hofmann & Osterwalder 2017; Oliver Wyman 2017).

Based on the definition by Grabher and van Tuijl (2020: 4), we understand digital platforms “*as programmable digital infrastructures controlled by platform operators who, as non-neutral intermediaries, curate the interactions of interdependent complementors and users.*” They permeate more and more areas of the economy and society, often with the self-claim of simplifying interactions for users or making them more efficient and acting as neutral matchmakers (Grabher & van Tuijl 2020). Prominent examples, such as Uber and Airbnb have shown that digital platforms can evolve into powerful actors in a relatively short time, and restructure existing production and work processes. Therefore, various authors also use the terms “*platform economy*” or “*platform capitalism*” (e. g., Kenney & Zysman 2016; Langley & Leyshon 2017; Srnicek 2017). With the beginning of platformisation, and especially with the growing gig economy, the following characteristics of platforms have been highlighted: So-called network effects are seen as essential for the functioning of platforms, meaning that the utility of the platform service increases with the increasing number of users (Grabher & van Tuijl 2020). This is one of the reasons for the monopolisation tendency and power concentration of digital platforms, which are often also fuelled by high venture capital investments in platforms (Langley & Leyshon 2017; Peck & Philips 2020).

Another characteristic of digital platforms is seen in the fact that in many cases they operate “*asset light.*” That is, the platform operators generally do not own the goods required for the transaction mediated by the platform (Grabher & van Tuijl 2020); rather, they tend to outsource responsibility to downstream actors. This has a particular impact on individual workers who receive jobs via platforms. They are often not in a formal employment relationship but act as independent contractors (Aloisi 2016; Graham et al. 2017). This has been criticised, particularly in terms of labour and social law, and has led to a number of legal disputes in the past – for example in the field of food delivery services (Degner & Kocher 2018). Algorithmic management – which is considered a trait of digital platforms – is also critically discussed, as this often represents a black box of the platform operators, thus greatly limiting the transparency and

participation of platform users and other actors (Graham et al. 2017; Wood et al. 2019). In this context, Richardson (2020a, b) emphasises that the algorithmically organised work in platform settings involves increased contingency and thus understands platforms as “*flexible spatial arrangements*” (Richardson 2020b: 458). The lack of possibilities of participation in common platforms is in line with the self-regulatory practices of platform operators. In many cases, their position as intermediaries enables them to determine the rules for their users, and the existing legal framework for regulating platform activities is often inadequate (Cohen 2017). Graham (2020: 4) therefore describes platforms as “*apparently too big to control, too new to regulate, and too innovative to stifle.*”

These features of dominant platform models create a number of tensions, as indicated, and raise the question of how different actors, and in particular, workers whose jobs depend on such platforms, react to these powerful digital intermediaries. In early studies on platforms and labour – which primarily deal with gig platforms – it becomes clear that, above all, the lack of protection for individual contractors requires action, such as legal regulations (e. g., Aloisi 2016; Graham et al. 2017). Thus, a number of protests of gig workers have taken place, demanding, for example, the acknowledgment of their employee status or minimum salaries. The question of how the often geographically dispersed gig workers can be mobilised, and how individual contractors can represent their interests, is also discussed in this regard (Johnston 2020; Tassinari & Maccarrone 2020). Hardaker (2021: 5), for instance, sees a general difficulty in resolving the power imbalances associated with platforms, as platform operations often involve “*unawareness, unaccountability and non-transparency.*”

The research on platform-related work and the possibilities of designing platforms in the interest of users and workers has so far focused primarily on gig platforms such as Uber, Foodora and co., which are also very present in public and media (e. g., Johnston 2020; Wells et al. 2021). A differentiated investigation of the various platform models, such as platforms operating in B2B relations, is rare so far. In the case of B2B platforms, for example, it could be expected that aspects relevant in B2C platforms, for example, the lack of protection for individual contractors, would play less of a role, since orders are then mainly placed with other firms and probably not with individuals. Also, the question of mobilisation of workers would then be different.

With the aim of contributing to a more differentiated picture of platforms and labour, we draw on the concept of labour agency (Coe & Jordhus-Lier 2011; Cumbers 2015). This concept is related to the labour-orientated research on global production networks (e. g., Cumbers et al. 2008;

Rainnie et al. 2011) and can thus be coupled to the aforementioned conception of logistics within the GPN framework. According to Coe (2015) and Cumbers (2015), a basic distinction is necessary between labour agency as an ever-present part of capitalist production, and agency as an attempt to “*shift the capitalist status quo in favour of workers*” (Coe & Jordhus-Lier 2011: 216). While early research on labour agency focused primarily on collective worker actions emanating from unionisation, a much broader understanding has emerged over time, with different forms of worker action and modes of organisation (Coe 2015). An attempt to distinguish worker agency strategies goes back to Katz (2004). According to her, agency can be differentiated into resilience as “*everyday coping practices,*” reworking as “*efforts to materially improve the conditions of existence,*” and resistance as “*direct challenge to capitalist social relations*” (Coe 2015: 174).

Related to labour agency and the aim of changing capital-labour relations in favour of workers, are power relations between actors, for instance in global production networks. A typology of power in the Global Value Chain approach (GVC), which is also suitable for the GPN framework, stems from Dallas et al. (2019). Based on the categorisation of direct and diffuse transmission mechanisms and the dyadic and collective arena of actors, a distinction can be made between “*bargaining power,*” “*demonstrative power,*” “*institutional power*” and “*constitutive power*” (Dallas et al. 2019: 673).

In order to examine power relations in the context of labour, there are approaches that are even more specific. A widely used approach to the conceptualisation of labour power goes back to Wright (2000) and distinguishes between workers’ “*structural power*” and “*associational power.*” Structural power can be understood as “*power that results simply from the location of workers within the economic system,*” and associational power as “*the various forms of power that result from the formation of collective organizations of workers*” (Wright 2000: 962). Building on this, Schmalz et al. (2018) developed the Power Resources Approach (PRA), which assumes that certain power resources can be mobilised to successfully defend worker interests in capital-labour relations. In addition to structural and associational power, “*institutional power*” as “*securing influence in institutional set-ups*” and “*societal power*” as “*coalitional power and discursive power*” are considered power resources (Schmalz et al. 2018: 116).

A number of contributions from critical geography and critical labour studies deal with labour power or labour agency, specifically in the logistics sector (e. g., Alimahomed-Wilson & Ness 2018; Jordhus-Lier et al. 2019; Nowak 2021). Central to this is the debate about the extent to which

logistics workers can use their position or structural power in supply chains, to exercise power and assert their interests. Relatively prominent in this discussion is the so-called “choke point” thesis (e. g., Alimahomed-Wilson & Ness 2018), with the idea that labour power can be exercised when workers or insurgents use their strategic position at choke points, and disrupt the closely timed flow of goods through collective action. However, approaches that attribute labour agency to specific worker action and the mobilisation of particular power resources, are partly also criticised for ignoring structural constraints and the broader political economy (Coe & Jordhus-Lier 2011; Cumbers 2015; Nowak 2021). These contributions call for labour geography and research on labour agency, to take into account the broader political, economic, and social spatiotemporal contexts in which workers are situated, and which are ultimately crucial to shifting the capitalist status quo. To analyse the “constrained agency,” Coe and Jordhus-Lier (2011: 228) suggest reflecting on “global production networks, state institutions at various scales, the social relations and associational life of the community, and intermediary agents in the labour market.” This is one more argument for the investigation of intermediary digital platforms and the effects on labour (agency) by using the GPN framework.

4 Method

To answer the research question of how digital B2B platforms affect labour in the freight transport sector, and what labour agency practices are emerging in the face of advancing platformisation, we examined the road freight transport sector in Germany. To collect empirical data a total of 27³ semi-structured interviews were conducted via video calls in the period 2020–2021 with the following groups of actors:

- representatives of platform operating firms in the freight transport sector, in order to understand how business models work and what their relationships with upstream and downstream firms looks like,
- representatives of freight forwarding and carrier firms of different sizes, to understand how platform operators influence their practices,
- individual workers and organised labour representatives from the logistics and freight transport sector, to understand the effects of digital platforms and related developments from the perspective of workers, and to explore potential counter initiatives.

The main questions of the interviews were adjusted according to the respective actors: interviews with platform operators focused mainly on questions about the business model, the functioning of the respective platform and the relationships with other actors within the production networks. The interviews with representatives of logistics firms from the transport segment were mainly related to questions about the use of digital logistics platforms and changes in the transport sector, particularly with regard to labour. More specifically, the interviews with drivers and workers’ representatives from the transport sector, focused on questions about the everyday practices of transport workers and how they deal with potentially changing working conditions.

The selection of the platforms is based on intensity sampling (Flick 2009: 122). As a first step, we compiled a database of 78 digital logistics platforms located in Germany through desktop research. This database includes information about the platform’s specific business models, their locations and offered services as well as the actors they connect. The majority (40) of these platforms operate in the road freight transport segment. The German road freight transportation market is characterised by low entry barriers and a high degree of fragmentation due to a large number of micro-enterprises. This opens up the possibility for logistics platforms to connect a large number of market actors (Stölzle & Häberle 2021). Due to the strong competition among transport firms and often precarious working conditions of transport workers (Gregson 2017; Zanker 2018), we expected platforms in the area of road freight transport to have a particular impact on existing structures, especially on labour in logistics. Against this background, we contacted all of the 40 digital platforms from the list that offer services related to road freight transport in Germany in a second sampling step.

In total, interviews with representatives of 9 digital logistics platforms were included in the empirical study. A small number of these platforms are established firms (2), but the majority are start-up firms (7) that have only been in existence for a few years. The respective platforms are located in Berlin (2), Munich (2), Hamburg, Dortmund, Cologne, Leipzig and Erkrath, mostly offering their services throughout Europe. It is noteworthy that many of the start-ups are financed by large corporations from the logistics sector, but also from sectors such as retail and automotive, as well as by various investment firms.

The interviews were analysed according to Mayring’s (2000) qualitative content analysis, in which the text material – in our case the interview transcripts – were paraphrased and abstracted in line with the research question. Deductively developed categories from the theory were expanded during the analysis by inductively derived cat-

³ In total, requests were sent to 125 potential interview partners. Of these, 27 were willing to be interviewed as part of our research.

egories as needed, so that previously unknown variables could be sufficiently taken into account. The results presented below thus constitute an interplay of theory and empirically derived data. Quotes from the interviews have been translated from German into English for this article.

5 Digital platforms in production networks of logistics

Before we explain the effects of digital platforms on labour from a structural perspective in this section, we outline the activities and the role of platforms in production networks of logistics. The digital platforms operating in the German logistics sector focus primarily on the road freight transport sector, and generally promise to make freight management more efficient and achieve higher utilisation of transportation vehicles. Primarily, these platforms serve as software providers that attempt to address the logistics sector with varying nuances. The degree of software solutions varies from platform to platform. There is a continuum between online freight exchanges, as mere marketplaces, and digital freight forwarders, which thus act as logistics firms themselves. However, as depicted by our interview partners, the aspirations of the platform operators are moving in the direction of acting less as mere marketplaces and more as value-added services providers, for example, by expanding the service spectrum and developing further automating processes, such as through the use of algorithms and artificial intelligence. One interviewee describes the future vision of the platform firm he works for as follows:

“The vision is of course to get this artificial intelligence onto the platform. [...] that it is already shown to our shippers or that the system already knows what the shipper needs before the shipper actually knows it himself” (interviewee from a platform operating firm).

The users connected via the platforms are, on the one hand, shippers of freight, specifically firms of various sizes from industry and retail, and, to a lesser extent, large 3PL firms. On the other hand, there are the carriers, which tend to be smaller freight forwarders and transport firms, that ultimately execute the orders mediated or generated by the platform. Digital platforms in logistics can accordingly be seen as intermediaries which, like 3PL, are important both in global production networks of client sectors and in logistics production networks (c.f., Coe 2021).

The neutrality often anchored in the platforms’ self-image is not always true, as the results show. Our interviews indicate that many digital logistics platforms are rather

orientated towards the interests of the large shippers from industry and retail, who are primarily concerned with outsourcing logistics, reducing freight costs and digitally mapping work processes. Only a few platform operators take the demands of carriers into account, and guarantee minimum freight prices, for example, so that wage costs can be adequately covered, or relief is provided for transport workers, who are under increasing pressure to perform more work in less time. Thus, in logistics too, digital platforms act as “*non-neutral intermediaries*” (Grabher & van Tuijl 2020: 4).

A definitive feature of digital platforms in logistics, and a differentiation from conventional 3PL, is the enormous concentration of information and data that platform operators can generate about their users, as one platform operator states in the following quote:

“We already have a very good insight into the market through the assignments that run through the platform, the prices that are set, and through the data that we generate there” (interviewee from a platform operating firm).

Digital platforms, especially online freight exchanges, develop their role as information providers primarily through the price transparency they create for shippers. For carriers, the digitally mapped price comparison for freight transport services ends in enormous competition and consequently, efforts to undercut. A trade unionist depicts the price-based mediation of freight transport services as follows:

“The platform mediates orders at the best possible price. This means for the firms that there is of course total price transparency. So, if you demand a higher price, you cannot compete” (interviewee from a trade union).

In this way, platform operators exert an influence on who participates in production networks on what conditions, and who is excluded from it at the same time, namely carriers who demand higher freight rates. Disarticulation processes induced by intermediaries, as observed in warehousing (Gutelius 2015), are promoted in the freight transport sector by digital platforms. Due to their digital operations, platforms can mediate freight orders across territorial borders quite easily. In the interviews it became clear that it is particularly difficult for small carriers which demand higher prices in order to maintain labour and social standards, to obtain orders via platforms, where a large number of carriers offer freight transport services at lower prices and consequently do not comply with these standards. One interviewee who worked for a platform operating firm, and subsequently founded a platform himself that guarantees

fair freight rates, describes the common platform model as follows:

“As a Spanish entrepreneur, I can choose any firm from Estonia without any problems. The disadvantage I see is that I have no overview of how these firms work according to social standards” (interviewee from a platform operating firm).

As a result, many carriers find themselves forced either to accept the conditions of the platforms and lower freight rates, which at the same time means a restriction on labour standards as well as lower wages, or to look for other ways to receive freight orders outside the platform. However, it is almost impossible for small carriers to escape the price pressure in the freight transport sector, which is not least created by freight mediators such as digital platforms. A carrier reports:

“A customer once said to us – we did get the order back after a few talks – but the procurement department simply said ‘yes, you deliver quality, but I can’t measure quality in euros’” (interviewee from a transport firm).

This statement already points to the next observation: carriers and transport workers are easily interchangeable for shippers using platforms, or for platforms acting as digital freight forwarders themselves. This is not only due to the multitude of carriers that are concentrated on platforms, but also due to the general trend towards commoditisation of logistics services (Coe 2021). This shift, in which services become widely available, as well as interchangeable, and thus where price competition predominates, is accelerated by digital platforms. The ability to easily interchange carriers via platforms, is thus producing increasingly contingent geographies of logistics.

The results demonstrate that digital platforms, as intermediaries, already hold a powerful position in production networks of logistics and shape the overall structure of freight transport labour. How the increased interchangeability of carriers due to platformisation affects labour conditions is further explained in the next section.

6 Downward pressure on labour and transferred responsibilities

The *“battle over value capture”* in logistics expressed by Newsome (2015: 38), is taken to the extreme through the proliferation of digital platforms. This applies not only to the battle between the intermediary 3PL and new platform agents, but also to the battle between the various

downstream logistics providers. The digital mediation of freight transport services via platforms facilitates further subcontracting in this field and, at the same time, limits the potential bargaining power of carriers due to extended value chains. The responsibility for ensuring that minimum wages and social standards are complied with is usually passed on to the carriers by platform operators through contractual regulations. However, it is well known in the sector that these standards can only be met above certain freight rates and that illegal, self-exploitative practices are often used among carriers when prices fall below a certain level. A former employee of a platform operating firm that operated as a digital freight forwarder, but has since been closed, reports:

“[...] it’s always quite easy to transfer everything to a subcontractor if there are any labour law problems or something like that. In the end, we didn’t really have anything to do with it, but if, let’s say, customs would have come to the yard and checked things, then surely something would have been revealed” (interviewee from a platform firm).

The platforms, or the shippers using them, act with the knowledge that there is always a carrier who can provide the freight transport service at an even lower price. Since there are no legal minimum freight rates, the differences between transport workers in terms of labour standards can be used by platform operators to capture value in production networks of logistics. In this way, the uneven geographies of capitalism are reproduced.

The consequence of the price war for carriers is that, especially in the case of professional drivers, the workload increases significantly, as the following quote demonstrates:

“Because of the fact that the prices are going down, I am forced to load more, and so the driver who ultimately does this, [...] has a lot more to do. Because he doesn’t just load once in the morning at eight and then take a break and unload once again the next day. Instead, they have to drive at their limits in terms of the legal framework, that is the driving times and the driving hours” (interviewee from a transport firm).

As a result, the conditions of work in the road freight transport sector are increasingly precarious. Carriers often adopt their own ways of dealing with the low prices paid for their work. Often, however, these practices are not compatible with the labour and social laws common in Germany. The employment relationships with subcontractors are particularly difficult to understand. For example, although many firms have their headquarters in Germany, they often hire workers from Eastern Europe, and do not guarantee them the rights they would be entitled to under German labour

law. An interviewee from a former platform operating firm puts it as follows:

“[...] we only had subcontractors who were located in Germany. How they got their drivers, there are certainly very dubious things happening there. But at the end of the day, we always made sure, at least contractually, that everything was somehow correct” (interviewee from a platform operating firm).

Despite the developments described above, it is difficult for trade unions, for example, to build a link to the actions of platform operators in the freight transport sector. That is because many transport workers, who ultimately carry out the transport services, do not know how the orders were assigned. In general, little seems to be known about how digital platforms operate in that field, and what consequences may arise. A trade union representative explains the situation as follows:

“The danger is not seen. Many think that such a platform is just like a website [...]. But this business model and the potential threat, is not recognised at all” (interviewee from a trade union).

Thus, the societal or discursive power of transport workers seems to be relatively low, especially when it comes to B2B platforms. Much happens under the radar, so we share Hardaker's (2021: 6) observation that *“Platforms often remain unacknowledged as such, since many processes are neither directly visible nor perceived as platform related.”*

It must also be acknowledged, that many of the structures described do not only occur with the use of digital platforms but represent pre-existing industry-wide trends in the road freight transport sector. Many of the phenomena, for instance the decreasing freight rates, can also be observed in freight mediation by conventional freight forwarders. Nevertheless, digital business models such as platforms seem to be increasing the pace of these developments, and the structures are becoming even more obscure due to the black box-like practices of these firms. In addition, platform operating firms in logistics are in a special position and perform a distinct form of intermediation due to the information asymmetries that arise from the concentration of user data.

7 Constrained labour agency in the freight transport sector

As shown in the previous section the *“subordination of labour; and work degradation”* in logistics (Newsome 2015: 42) is further exacerbated by platformisation, and the

accumulation of capital by platform operating firms in the transport sector runs simultaneously. This leads us to the question of what action workers and allies take to deal with or counteract this development. Based on Katz's (2004) distinction, the empirical evidence from the road freight transport sector allowed us to observe mainly *resilience* as well as a few *resistance* and *reworking* practices. Resilience can be seen as the everyday coping strategy of transport workers in dealing with the increasing workload. However, these practices are increasingly on the edge of legality and do not necessarily represent an improvement of working conditions in terms of applicable standards, but can rather be understood as subjectification mechanisms of workers (e. g., Bröckling 2007). Based on our empirical material these are, for example, the disregard of rest and driving times, the use of several workers for the same vehicle, or the manipulation of tachographs in order to circumvent rest times as well as the disobeying of cabotage⁴ regulations. One interviewee, who was working for a platform operating firm, reports on the practices of subcontractors:

“Maybe the boys arrive here and have been on the road for 26 hours in a long-haul sprinter with two or three people, sleeping in turns [...]. That's not very nice at all. And it's actually not allowed, but unfortunately, it's common practice” (interviewee from a platform operating firm).

Resistance practices – which are rather connected with the intention of improving working conditions in the transport segment – could be observed in this study in the form of an interest grouping of small transport firms and professional drivers. The association, which is now registered, was initially a rather loose interest group that organised demonstrations to draw the attention of politicians and the public to the grievances in the road freight transport sector; for instance the price pressure caused by freight mediators, such as platforms. Traditional forms of collective organisation of workers, in the form of works councils and trade unions, are not very common in the German road freight transport sector. Some trade union representatives interviewed even describe the transport segment as an anti-works council and anti-union milieu. They see the reasons for this in the autonomy and individualist aspirations of many professional drivers as well as in the fragmented

⁴ According to the Bundesamt für Güterverkehr (2022: n. p.), cabotage is the *“carriage of goods by road for hire or reward with a place of loading and unloading in a State, known as the host Member State, by an operator who has neither a registered office nor an establishment in that State”* (own translation). In this regard, provisions of the European Union are binding, which, among others, determine that cabotage transport must be carried out within three days.

structure of transport firms, in which there are few opportunities for collective organisation, as the following quote by a trade unionist demonstrates:

“The industry structure is totally hostile to works councils and trade unions, because there are no large firms in the road transport sector [...] but instead these are generally small, family-run businesses” (interviewee from a trade union).

Additionally, there is a high proportion of migrant workers in the road freight transport sector who are scarcely organised in trade unions, also due to the fact that they are often in precarious situations already and might fear losing their jobs when organising. These structures are not completely new to logistics or the freight transport sector as our interviews indicate but are further exacerbated by the use of digital platforms, as workforces or contractors become even more spatially dispersed and contract relationships are increasingly obscure. Thus, the associational power of transport workers remains relatively weak. In addition, there are examples where the establishment of works councils in platform operating firms is actively prevented. An interviewee who worked in a firm that subcontracted some of its transport services as a digital freight forwarder, but also employed some of the drivers, recalls the wording of a supervisor, which sounds like a threat, as follows:

“If anyone starts a works council here, I’ll shut the firm down sooner than you think and reopen it two days later with a different workforce” (interviewee from a platform operating firm).

In addition to the resistance by interest groups of carriers, there are also some cases of reworking in reaction to the practices of the common platform models. These are two foundations of digital platforms that explicitly want to prevent price dumping in the freight transport sector and only allow freight offers that are above a certain minimum freight rate. This is intended to guarantee fair working conditions for carriers and drivers. The operators of the platform are, on the one hand, a former employee of a digital freight forwarding platform and, on the other hand, the founder of the aforementioned interest group, who is himself the head of a medium-sized transport firm. However, the extent to which these practices can actually cause a shift in the *“status quo in favour of workers”* (Coe & Jordhus-Lier 2011: 216) in the road freight transport sector in the long term, remains questionable.

The practices of carriers and transport workers cited, can rather be understood as diffuse transmission mechanisms of power, which express themselves rather less in *“overt inter-actor conflicts”* or traditional, union-lead forms of labour agency (Dallas et al. 2019: 673). As the following

quote illustrates, although professional drivers in theory may have structural power, it seems to be difficult to mobilise it:

“They [transport workers] have so much power and all they would have to do is say ‘We’re not going for two days and then we’ll see if you don’t change something about our working conditions,’ they would do whatever they want, but they just can’t manage it” (interviewee from a trade union).

Overall, the findings indicate that labour agency in the freight transport sector remains constrained with the ongoing platformisation. Many of our interview partners see a crucial reason for this is in the lack of legal regulations or, in other words, in the relatively weak institutional power of carriers and transport workers. A way to reduce the race to the bottom and improve working conditions in the platform-mediated freight transport could be, for example, to make minimum freight rates mandatory, and to ensure that labour and social standards can be met with the prices offered on digital B2B platforms.

8 Conclusion

This paper aims to gain a better understanding of the impact of platformisation on labour, from a geographical perspective. To achieve this, logistics, specifically the road freight transport sector in Germany, was used as an empirical case, since digital B2B platforms are of growing importance in that field. Based on the GPN framework, the study addressed the question of how digital B2B platforms affect labour in the freight transport sector and what labour agency practices are emerging in the face of advancing platformisation.

The paper makes the following contributions to the research: On the one hand, it contributes to the geographical literature on platformisation and platform labour, (e. g., Grabher & van Tuijl 2020; Bearson et al. 2021; Howson et al. 2022) by investigating so far neglected B2B platforms from a GPN perspective. On the other hand, it contributes to the GPN-related literature on logistical labour and labour agency (e. g., Coe & Jordhus-Lier 2011; Gutelius 2015; Newsome 2015) by shedding light on the effects of new digital agents, namely digital B2B platforms on the geographies of logistical work.

The results show that the impact of digital B2B platforms should be considered in relation to the specific context in which it is embedded. This is because many developments associated with these platforms are often not entirely new, but reproduce and reinforce existing

structures, as demonstrated in the case of the road freight transport sector. However, what is distinctive about the new intermediaries, the digital B2B platforms in logistics, is that they make it extremely easy to interchange logistics providers by digitally concentrating freight orders and displaying freight rates to clients. Platforms thus shape the inclusion and exclusion of transport workers in production networks and produce increasingly contingent geographies of logistics.

The increased interchangeability of logistics services facilitated by platforms furthermore results in an enormous price war among carriers, creating ever more precarious working conditions in the road freight transport sector. Even though it is well known that labour standards can only be met above certain freight rates, most of the platform operating firms take no action and instead transfer responsibilities to the carriers. Transport workers are thus left to find their own ways – often accompanied by illegal practices – to cope with falling freight rates, and wages, as well as increased workloads. In this way, they also play an important part in shaping the geographies of logistics.

In terms of the labour agency practices emerging in the advancing platformisation, we can draw the following conclusions from our findings. The sole notion of agency as collective organisation of workers via works councils or trade unions, is out of step with platformisation; especially in the case of mobile, spatially dispersed workforces or contractors, such as in the road freight transport sector, strikes are increasingly difficult to coordinate. However, there are some examples of resistance practices, which are more policy-orientated and not only limited to platform operations, as well as a few reworking practices by transport workers, which are not necessarily the result of overt labour conflicts. It becomes clear that the intermediary function of platforms can in theory also be used in favour of workers' interests, for example, to enforce certain standards such as minimum freight rates, with the help of the digital infrastructure. Overall though, labour agency in the freight transport sector remains constrained with the ongoing platformisation. Greater political commitment and legislation would be necessary to make platform operators and their clients responsible for guaranteeing labour and social standards, and to prevent the widespread illegal practices in the freight transport sector.

Taking the road freight transport sector as an example, our findings illustrate that the euphemism about the use of “choke points” (e. g., Alimahomed-Wilson & Ness 2018) in logistics, or the supposedly strategic position of logistics workers, is not sufficient in every case to formulate and enforce labour interests. Moreover, while approaches such as the Power Resources Approach (Schmalz et al. 2018) can

be useful in describing different types of labour power, they are not sufficient to explain what prevents labour on a structural level from mobilising these power resources. In line with Coe and Jordhus-Lier (2011) and Nowak (2021), we emphasise that geographical approaches such as the GPN approach are useful in understanding how certain labour agency practices come about, and how the capital-labour relationship is shaped in certain contexts.

The results of the study must be considered against the specific context of the German freight transport sector. As there are institutional differences (e. g. specific laws and regulations in the road freight transport sector) and differences regarding market structures (e. g. firm characteristics and degree of competition) between Germany and other countries (especially non-EU countries), the empirical results are not easily transferable. Further research is needed to examine potential country differences regarding the impact of digital platforms on labour and platform-related labour agency practices. This includes additional case studies, but also broader and comparative quantitative studies.

Moreover, in order to better understand the effects of platformisation from a geographical perspective, we see a need for further conceptual reflection on how the increasing prevalence of digital platforms restructure existing production relations, and how the practices of actors involved are changing. On a conceptual level, it would be useful to understand how platform intermediaries differ from previous intermediaries in global production networks. Empirically, this could be done in the logistics sector, for example, in comparison to 3PL firms. Furthermore, it would be useful to understand conceptually, and through further empirical examples, what specific changes are being brought about by platformisation for workers and labour agency. Again, this raises the question of how labour in the platform economy differs from existing structures. For the logistics, and specifically the freight transport sector, more extensive insights into the everyday practices of transport workers would be necessary in this regard – and this is to be understood as a critical reflection of our investigation. However, these are relatively difficult to obtain, especially when it comes to the practices verging on legality that are characteristic of parts of the logistics sector.

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References

- Alimahomed-Wilson, J., & Ness, I. (2018) Introduction: Forging Workers' Resistance Across the Global Supply Chain. In: J. Alimahomed-Wilson & I. Ness (eds), *Choke Points: Logistics Workers Disrupting the Global Supply Chain* (pp. 1–15). London: Pluto Press.
- Aloisi, A. (2016) Commoditized workers: case study research on labor law issues arising from a set of “on-demand/gig economy” platforms. *Comparative labor law and policy journal*, 37: 653–690.
- Anwar, M.A. & Graham, M. (2021) Between a rock and a hard place: Freedom, flexibility, precarity and vulnerability in the gig economy in Africa. *Competition & Change*, 25(2): 237–258.
- Aoyama, Y. & Ratick, S.J. (2007) Trust, transactions, and information technologies in the US logistics industry. *Economic Geography*, 83(2): 159–180.
- Bair, J. & Werner, M. (2011) Commodity chains and the uneven geographies of global capitalism: a disarticulations perspective. *Environment and Planning A*, 43(5): 988–997.
- Barrientos, S. (2013) “Labour chains”: analysing the role of labour contractors in global production networks. *The Journal of Development Studies*, 49(8): 1058–1071.
- Bauriedl, S. & Strüver, A. (2020) Platform Urbanism: Technocapitalist Production of Private and Public Spaces. *Urban Planning* 5(4), 267–276.
- Bearson, D., Kenney, M. & Zysman, J. (2021) Measuring the impacts of labor in the platform economy: new work created, old work reorganized, and value creation reconfigured. *Industrial and Corporate Change* 30(3): 536–563.
- Bröckling, U. (2007) *Das unternehmerische Selbst. Soziologie einer Subjektivierungsform*. Frankfurt am Main: Suhrkamp.
- Bundesamt für Güterverkehr (2022) *Kabotage*. Available at: <https://www.bag.bund.de/DE/Service/Schnellservice/Rechtsvorschriften/Gueterkraftverkehr/Kabotage/Kabotage.html> [Accessed 15 August 2022].
- Coe, N.M. & Jordhus-Lier, D.C. (2011) Constrained agency? Re-evaluating the geographies of labour. *Progress in Human Geography*, 35(2): 211–233.
- Coe, N.M. & Yeung, H.W.C. (2015) *Global production networks: Theorizing economic development in an interconnected world*. Oxford: Oxford University Press.
- Coe, N.M. (2014) Missing links. Logistics, governance and upgrading in a shifting global economy. *Review of International Political Economy*, 21(1): 224–256.
- Coe, N.M. (2015) Labour and Global Production Networks: Mapping Variegated Landscapes of Agency. In: Taylor, P., Newsome, K., Rainnie, A. & Bair, J. (eds): *Putting Labour in its Place: The Labour Process and Global Value Chains* (pp. 171–192). London: Palgrave.
- Coe, N.M. (2020) Logistical geographies. *Geography Compass*, e12506: 1–16.
- Coe, N.M. (2021) Coping with commoditization: The third-party logistics industry in the Asia-Pacific. *Competition & Change*, 25(3–4): 281–307.
- Coe, N.M., Dicken, P. & Hess, M. (2008) Global production networks: realizing the potential. *Journal of Economic Geography*, 8(3): 271–295.
- Cohen, J.E. (2017) Law for the Platform Economy. *University of California Davis Law Review*, 51: 133–204.
- Cumbers, A. (2015) Understanding labour's agency under globalization: embedding GPNs within an open political economy. In: Taylor, P., Newsome, K., Rainnie, A. & Bair, J. (eds): *Putting Labour in its Place: The Labour Process and Global Value Chains* (pp. 135–151). London: Palgrave.
- Cumbers, A., Nativel, C. & Routledge, P. (2008) Labour agency and union positionalities in global production networks. *Journal of economic geography*, 8(3): 369–387.
- Dallas, M.P., Ponte, S. & Sturgeon, T.J. (2019) Power in global value chains. *Review of International Political Economy*, 26(4): 666–694.
- Degner, A. & Kocher, E. (2018) Arbeitskämpfe in der “Gig-Economy”? Die Protestbewegungen der Foodora- und Deliveroo-“Riders” und Rechtsfragen ihrer kollektiven Selbstorganisation. *Kritische Justiz*, 51(3): 247–265.
- Ettlinger, N. (2016) The governance of crowdsourcing: Rationalities of the new exploitation. *Environment and Planning A: Economy and Space*, 48(11): 2162–2180.
- Flick, U. (2009) *An Introduction to Qualitative Research*. 4th Edition. Los Angeles: Sage.
- Franz, M. (2010) The potential of collective power in a global production network: Unicom and Metro Cash & Carry in India. *Erdkunde*, 64(39): 281–290.
- Franz, M., Felix, M. & Trebbin, A. (2014) Framing smallholder inclusion in global value chains—case studies from India and West Africa. *Geographica Helvetica*: 69(4): 239–247.
- Fuchs, M., Dannenberg, P., López, T., Wiedemann, C. & Riedler, T. (2022) Location-specific labour control strategies in online retail. *ZFW – Advances in Economic Geography*, online first..
- Grabher, G. & van Tuijl, E. (2020) Uber-production: From global networks to digital platforms. *Environment and Planning A: Economy and Space*, 52(5): 1005–1016.
- Graham, M. (2020) Regulate, replicate, and resist – the conjunctural geographies of platform urbanism. *Urban Geography*, 41(3): 453–457.
- Graham, M., Hjorth, I. & Lehdonvirta, V. (2017) Digital labour and development: impacts of global digital labour platforms and the gig economy on worker livelihoods. *Transfer: European Review of Labour and Research*, 23(2): 135–162.
- Gregson, N. (2017) Logistics at Work: Trucks, Containers and the Friction of Circulation in the UK. *Mobilities*, 12(3): 343–364.
- Gutelius, B. (2015) Disarticulating distribution: Labor segmentation and subcontracting in global logistics. *Geoforum*, 60: 53–61.
- Hardaker, S. (2021) Platform economy: (dis-)embeddedness processes in urban spaces. *Urban Transformations*, 3(12): 1–13.
- Henderson, J., Dicken, P., Hess, M., Coe, N.M. & Yeung, H.W.C. (2002) Global production networks and the analysis of economic development. *Review of international political economy*, 9(3): 436–464.
- Herb, C. & Neiberger, C. (2021) Intermediation, Disintermediation und Cybermediäre: Zum Einfluss der Digitalisierung auf Wertschöpfungsketten in der Schuhbranche. *Zeitschrift für Wirtschaftsgeographie*, 65(3–4): 147–164.
- Herod, A. (1997) From a geography of labor to a labor geography. *Antipode*, 29: 1–31.
- Hofmann, E. & Osterwalder, F. (2017) Third-Party Logistics Providers in the Digital Age: Towards a New Competitive Arena? *Logistics*, 1(9): 1–28.
- Howson, K., Ferrari, F., Ustek-Spilda, F., Salem, N., Johnston, H., Katta, S., Heeks, R. & Graham, M. (2022) Driving the digital value network: Economic geographies of global platform capitalism. *Global Networks*, 22: 631–648.
- Johnston, H. (2020) Labour geographies of the platform economy: Understanding collective organizing strategies in the context of digitally mediated work. *International Labour Review*, 159(1): 25–45.
- Jordhus-Lier, D., Underthun, A. & Zampoukos, K. (2019) Changing workplace geographies: Restructuring warehouse employment in

- the Oslo region. *Environment and Planning A: Economy and Space*, 51(1): 69–90.
- Katz, C. (2004) *Growing Up Global: Economic Restructuring and Children's Everyday Lives*. Minneapolis, MN: University of Minnesota Press.
- Kenney, M. & Zysman, J. (2016) The rise of the platform economy. *Issues in science and technology*, 32(3): 61–69.
- Kenney, M. & Zysman, J. (2020) The platform economy: restructuring the space of capitalist accumulation. *Cambridge Journal of Regions, Economy and Society*, 13(1): 55–76.
- Langley, P. & Leyshon, A. (2017) Platform capitalism: the intermediation and capitalization of digital economic circulation. *Finance and society*, 3(1): 11–31.
- Lehdonvirta, V., Park, S., Krell, T. & Friederici, N. (2020) Platformization in Europe Global and local digital intermediaries in the retail, taxi, and food delivery industries. Available at: https://www.oii.ox.ac.uk/wp-content/uploads/2021/07/Platformization-in-Europe_Platform-Alternatives.pdf [Accessed 17 January 2023].
- Mayring, P. (2000) Qualitative Content Analysis. *Forum: Qualitative Social Research*, 1(2). Available at: <https://www.qualitative-research.net/index.php/fqs/article/view/1089/2385> [Accessed 15 April 2017].
- Newsome, K. (2015) Value in motion: labour and logistics in the contemporary political economy. In: Taylor, P., Newsome, K., Rainnie, A. & Bair, J. (eds): *Putting Labour in its Place: The Labour Process and Global Value Chains* (pp. 29–45). London: Palgrave.
- Nowak, J. (2021) Do choke points provide workers in logistics with power? A critique of the power resources approach in light of the 2018 truckers' strike in Brazil. *Review of International Political Economy*, 29(5): 1675–1697
- Oliver Wyman (2017) *How Start-Ups Are Digitalizing Logistics*. Available at: https://www.oli-verwyman.de/content/dam/oliver-wyman/v2/publications/2017/aug/How_Start-ups_Are_Digitalizing_Logistics.pdf [Accessed 15 March 2019].
- Peck, J. & Phillips, R. (2020) The platform conjuncture. *Sociologica*, 14(3): 73–99.
- Rainnie, A., Herod, A. & McGrath-Champ, S. (2011) Review and positions: Global production networks and labour. *Competition & Change*, 15(2): 155–169.
- Raj-Reichert, G. (2020) The powers of a social auditor in a global production network: the case of Verite´ and the exposure of forced labour in the electronics industry. *Journal of Economic Geography*, 20: 653–678.
- Richardson, L. (2020a) Platforms, markets, and contingent calculation: The flexible arrangement of the delivered meal. *Antipode*, 52(3): 619–636.
- Richardson, L. (2020b) Coordinating the city: platforms as flexible spatial arrangements. *Urban Geography*, 41(3): 458–461.
- Schmalz, S., Ludwig, C., & Webster, E. (2018) The power resources approach: Developments and challenges. *Global Labour Journal*, 9(2): 113–134.
- Srnicek, N. (2017) *Platform capitalism*. Cambridge: Malden.
- Stölzle, W. & Häberle, L. (2021) Digitale Logistikplattformen – Erste Ansätze zur Marktsegmentierung im Lichte traditioneller und neuer Anbieter. In: Fritzsche, R., Winter, S. & Lohmer, J. (eds.): *Logistik in Wissenschaft und Praxis* (pp. 241–264). Wiesbaden: Springer Gabler.
- Tassinari, A. & Maccarrone, V. (2020) Riders on the Storm: Workplace Solidarity among Gig Economy Couriers in Italy and the UK. *Work, Employment and Society*, 34(1): 35–54.
- Vallas, S. & Schor, J.B. (2020) What Do Platforms Do? Understanding the Gig Economy. *Annual Review of Sociology*, 46(1): 273–294.
- Verfürth, P., Franz, M. & Helwing, V. (2023) *Digitale Business-to-Business-Plattformen im Logistiksektor. Auswirkungen auf Arbeit und Reaktionen von Betriebsräten und Gewerkschaften*. Working Paper Forschungsförderung, 272, Düsseldorf: Hans-Böckler-Stiftung. Available at: https://www.boeckler.de/fpdf/HBS-008542/p_fofoe_WP_272_2023.pdf [Accessed 13 April 2023].
- Wells, K.J., Attoh, K. & Cullen, D. (2021) “Just-in-Place” labor: Driver organizing in the Uber workplace. *Environment and Planning: Economy and Space*, 53(2): 315–331.
- Wood, A.J., Graham, M., Lehdonvirta, V. & Hjorth, I. (2019) Good Gig, Bad Gig: Autonomy and Algorithmic Control in the Global Gig Economy. *Work, Employment and Society*, 33(1): 56–75.
- Wright, E.O. (2000) Working-class Power, Capitalist-class Interests and Class Compromise. *American Journal of Sociology*, 105(4): 957–1002.
- Yeung, H.W.C. & Coe, N. (2015) Toward a dynamic theory of global production networks. *Economic Geography*, 91(1): 29–58.
- Zanker, C. (2018) *Branchenanalyse Logistik. Der Logistiksektor zwischen Globalisierung, Industrie 4.0 und Online-Handel*. Hans-Böckler-Stiftung.