RESEARCH ARTICLE

Circulating through the pipeline. Algorithmic subjectivities and mobile struggles

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ABSTRACT: We are living within a transformation that has been variously labelled as industrial revolution 4.0, platform economy, digital capitalism. Nevertheless, this change is still mainly conceptualized through the vocabulary of factory system. In this article we aim to contribute to the development of an emerging framework on the 'new capitalism' without any nostalgia for the past by exploring some of its potential interpretative categories (pipeline, algorithmic subjectivities, mobile struggles), based in particular on its spatial configurations and on the production of living labour' subjectivities. Indeed, we are witnessing not simply a wave of technological innovation but a more general transformation of the forms of capitalist valorisation which rely on the role played by spaces and social cooperation. These changes do not affect only spatialities but also the subjective forms of living labour, including his/her practices of organization and struggle.

KEYWORDS: algorithmic management, capitalism 4.0, digital technologies, factory, platform labour

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1. Introduction

According to a shared opinion we are living within a transformation that has been variously labelled as *industrial revolution 4.0* (Schwab 2016; Umachandran et al. 2019), *platform capitalism* (Srnicek 2016; Weatherby 2018), *digital capitalism* (Betancourt 2016; Pace 2018; Schiller 2000; Zuboff 2019), *data capitalism* (Myers West 2017), *algorithmic capitalism* (Peter 2017). It is worth noting that the proliferation of lemmas to describe this transition, which are, by the way, rather concordant with each other, gives back the sense of a debate that, compared to the last decades, is no longer based on the need to qualify as 'post' the moment we are inhabiting. In fact, for a long time, even within a variegated scientific dispute, a rather well-established line of interpretation moved around the idea of a *post-industrial* (Bell 1976), *post-Fordist* (Amin 1994), *post-work society* (Aronowitz and Cutler 1998).

As a matter of fact, today it seems that contemporary capitalism could be read in 'positive' terms and not just in the light of what is no longer there. This new approach, moreover, conveys the idea that the Fordist system, which has long been seen by Western scholars as a 'standard' of capitalism and as a sort of necessary 'arrival point' for all economies, is actually to be framed as a historical exception (Neilson and Rossiter 2008). Such perspective contributes to move away from a Western-centric vision by abandoning the terrain of 'standard labour' as universal term of comparison. As Jan Breman and Marcel van der Linden (2014) pointed out, "while the regime of informality has always been the dominant mode of employment in the developing world, the Western economies now also demonstrate a strong trend towards informalization or precarization of working-class life. This tendency has been much strengthened and accelerated by the global economic crisis since 2007/08" - that is exactly the event that triggered the "platform revolution" (Parker, Van Alstyne and Choudary, 2016).

Nevertheless, often the conceptual framework used to analyse the capital's transformations - because of the spread of digital technologies, the so-called platform capitalism - still refers to the factory system and the Taylorist principles of its organization. This approach, in many cases, leads to consider platform-based jobs as a sort of escape from the standard labour – one more time assumed as reference point.

Taking advantage from these preliminary considerations, in this article we aim to contribute to the development of an emerging framework on the 'new capitalism' (Cuppini et al. 2022) without any nostalgia for the past by exploring some of its potential interpretative categories, focusing in particular on its spatial configurations and on the production of living labour' subjectivities. What we will argue[1] is that the longstanding wave of digitization in the labour processes we are witnessing has to be strictly connected with a re-organization of the sites of production that moved beyond the hegemony of the factory as discrete unit. Put it differently, we are witnessing not simply a wave of technological innovation but a more general transformation of the processes of capital valorisation. These changes do not affect only spatialities but also the subjective forms of living labour, including his/her practices of organization and struggle. For this reason, we will take into account the factory as historical paradigm and its relationship with a particular working-class subjectivity to show how the mutation of the first is unavoidably associated with transformations of the latter. Referring in particular to the platform labour in urban spaces, we will propose the concept of pipeline as promising framework to be tested in further investigations beyond locality-based digital workers.

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[1] The article is the output of a strong collaborations between the authors to define a general argumentation and a common objective. Niccolò Cuppini contributed in particular to the paragraph on the evolution of the factory towards the pipeline; Mattia Frapporti elaborated the paragraph on the algorithmic subjectivities; Maurilio Pirone has been in charge to develop the analysis of mobile struggles.

In the first part of the article, we analyse the longstanding evolution of the factory, proposing and testing the concept of pipeline as explanatory of the digitized, logistical and centralized features of production through urban spaces in platform capitalism nowadays. In the second part, we show how these transformations are strictly connected with changes in the forms of subjectivation of living labour, considering digital labour in terms of algorithmic and circulatory subjectivities. In the third part, we focus on the practices this new class composition employs to deal and struggle within the pipelines. Even if the main aim of the article is to furnish potential theoretical categories, we try to materialize them with the support of examples and case studies taken from the results of H2020 project PLUS[2] (Platform Labour in Urban Spaces). Put it differently, we focus on a specific form of platform labour – locality-based labour that is different from cloudwork (Howson, et al., 2022) – but potentially the conceptual framework we propose could be further tested as more general perspective on contemporary capitalism.

2. From the factory-city to the pipeline

The image of the factory has strongly come back to describe spatialities under capitalism 4.0. A factory that is certainly transfigured, that neither recalls the past nor envisages absolute continuity with Fordism. A *factory without walls* (Ashton 2006), a *digital factory* (Altenried 2022), a *4.0 factory* (Fontana 2021; Gaddi 2021), a *global factory* in which the degrees of separation between the land-grabbing and the high-frequency trading are increasingly narrow. A factory that produces new regimes of discipline of its subaltern labour, that commands and exploits living labour in old and new forms by assembling original accumulation and formal, real and total subsumption (Into the Black Box 2021). But it is not only the critical theory that is reviving the concept of the factory. Indeed, the compulsive use by many 4.0 labour companies of the term factory (such as 'fun factory', 'creative factory', 'knowledge factory', 'food factory', 'art factory') should be noted, betraying the workaholic ethos that is becoming increasingly difficult to conceal: "work hard, have fun, make history" suggests an inscription that stands at the entrance to Amazon warehouses. On the other hand, the theme has also resonated in the mobilisations of platform workers, as for example in the struggles of the riders organized in the autonomous CLAP union in Paris who have often used the slogan 'La rue est notre usine' ('The street is our factory').

How can we explain these common references to the factory system in relation to the digital transformation? More specifically, is it possible to analyse the diffusion of digital platforms into urban spaces using the framework of the factory? Is it a smooth slipping or this implies a resignification of the concept of factory? To try to propose a looking-ahead theoretical framework we will call back two longstanding critical approaches – the Henri Lefebvre' critical urbanism and the Italian Workerism' analysis of territory – whose conceptual tools could be useful to analyse the relationship between platforms and urban spaces, as well as between digitization and territoriality more broadly.

Recent years have witnessed a recovery and reinterpretation of Henri Lefebvre's thought on urban space (Lefebvre 2009), especially through the works of David Harvey (2001, 2006, 2012), Neil Brenner (2013, 2017) and Christian Schmid (2022): the city as a projection of society onto the territory is therefore an established analytical lens, and we think it can also be a productive key to investigate capitalism 4.0. In this sense, we may say that the factory is not only a specific place in the modern city, but also a concept that hinges on the idea of

the metropolis as a flexible and infinitely extendable territorial organism, whose task is to reproduce and organize living labour. From this perspective, the factory is not only a building or even a place; rather, it is a set of machines, a spatial diagram whose function is to adapt physical spaces to the technical composition of capital that makes productive work and its exploitation possible. Put it differently, the factory-place is just one specific form of the factory-diagram, the latter more generally theorised as an apparatus linking work to the *res extensa* of social valorisation. The factory therefore does not have a definitive form, but is rather a process in continuous transformation that, from a strategically relocated centre, innervates and organizes the territory. If there is a factory, there is a logistics network that coordinates machines, transport, flows of people, raw materials, goods: the scope of the factory is always the territory (Aureli, 2017).

Moreover, we also draw on 1970s' (Wright 2002) Italian Workerism' analysis on the relation between labour-power and territory, attempting to translate some recommendations of method with respect to the capitalist and class use of space nowadays. Indeed, for the 1970s' Italian journal *Quaderni del territorio* (Magnaghi 2021), the main aim was the attempt to politicize urban spaces, which had been investigated in the transition between two key categories: the first was the *city-factory*, understood as a specific territorial assemblage produced by the Fordist system and its social subjects[3]; the second was the *scattered factory,* highlighting the dismantling of the central position held by blue-collars and industrial plants in the West as well as the simultaneous articulation of the production across the territory and along the global value chains[4]. We may say that in the city-factory, the factory as well-defined space of production was the pivot around which the more general "arcane of reproduction", the exploitation of reproductive and affective labour necessary for the formation of the working class (Fortunati 1981), was organized within the city. The 1970s saw the beginning of a progressive process of transformation of a new economic machine in which city and territory, "inside" and "outside", are integrated in a system that is redefined through both the distribution of the factory over the territory – as a result of the logistical counter-revolution[5] – and the progressive inclusion of social

[3] In his essay *Notes on class recomposition and the crisis of the labour market* (1996), Romano Alquati warned against the error of «going back to separating production from reproduction, or production from the state political system» in the struggle of the proletariat. In essence, if we follow this elaboration, it can be said that the metropolis and the territory are never anything other than a mode of social production. According to another workerist, Ranieri Panzieri, «the part of the process which in the early stages of capitalism appeared as an important but specific fact, closed in itself, i.e. the factory, becomes generalised: the factory tends to pervade, to permeate the whole society, even the external area […]. The characteristic features of the factory – the particular type of subordination of the living labour-power to capital, etc. ¬– tend to pervade all levels of society, finding themselves there in specific forms» (Panzieri 1976, 40).

[4] Alberto Magnaghi in *Aree metropolitane e ristrutturazione produttiva (*1974) grasped the transformation of urban space from a factory-city to a metropolitan structure formed by the intersection of several cycles of production, by the concentration of «command and information, of services, by the concentration of labour-power markets» (62). The combination of these elements defines the identity of metropolis as a social factory within the international division of labour. In nuce we see what will become evident a few decades later: the metropolis is a urban and social process and not a geographical or administrative entity.

[5] A conspicuous bibliography identifies in the 60s the burst of so-called Logistics Revolution. Bruce Allen, in a 1997 article titled *The Logistics Revolution and Transportation* was the first to label that period in such way. Then Edna Bonacich and Jake Wilson in *Getting the goods. Ports, labor and the logistics revolution* (2008) and Deborah Cowen *The deadly life of logistics* (2014) contributed to brush up the concept in the New Millennium when the role of logistics raised clearly. We consider that period of a crucial importance too, first because it is the moment when planetary logistics became linked with global capitalism as never before initiating the second wave of globalization. At the same time, it allows us to show an essential political aspect of logistics that impacted on the working class that lead us to talk about Logistics Counter-Revolution.

We could analyse Logistics Revolution from different gazes but generally speaking it concerns big changes in the management sector, a retail revolution and a technological transformation. Referring to the changes in management, the very core of the logistics revolution can be explained as Deborah Cowen does: «cost minimization had been replaced with a model that emphasized value added» (Cowen 2014, 34). Logistics became no more a "necessary evil", something set up to reduce the so-called "circulatory time" to zero, to recall Volume II of Capital by Marx. Rather from the 60s on, logistics became draw by a business logic and rationality thanks to a systemic approach. Until then, «physical distribution was concerned exclusively with the movement of finished products» (Ivi, 35). After Logistics Revolution attention was focused upon the total action «rather than upon its individual components» (Ibidem): distribution was no more considered something different and separated by the production, but it was rather understood as an element of the production itself.

reproduction into valorisation through its industrialization. With the "factorization" of society the factory-diagram itself had become inextricably linked to the territory and thus to its forms of life[6].

The challenge today is therefore to identify the ways the relationship between factory and territory, work and social valorisation evolved under tech innovation. The novelty is that digital platforms and technologies make social reproduction a sphere of direct organisation and exploitation that is no longer invisible. Platforms like Uber, Airbnb or Deliveroo place social reproduction under the command of algorithms. This implies a deeper integration of productive processes into the social fabric. After all, the explosion of apps for everyday operations of urban life are nothing but the logical continuation of the extension of the factory over society: Uberisation of space is nothing but the accelerated continuation of urbanisation.

Furthermore, today the relationship between circulation and production has definitely 'reversed', with the circulation 'commanding' over production (Lichtenstein, 2010; Into the Black Box, 2021). This of course does not mean that the production of goods disappeared, but rather that capitalism 4.0 expresses a model in which the demands for the fluidity of circulation – the Toyotist 'just in time and to the point' logic – dictate rhythms, standards and models for the production apparatus. The factory-diagram into the city is articulated through strategic places that animate the urban territorial machine and function as bottlenecks in relation to it. The bottleneck does not obstruct but regulates the flow, directs its force and regulates its power. At the same time, the bottleneck - precisely because it creates friction - is always in the process of being obstructed and blocking the flow. The factory must therefore be thought of as a specific junction within a machinic system that brings together many seemingly inhomogeneous things such as living labour, transports, logistics, the algorithmic systems of finance, but also natural resources and agricultural territories.

This, among other things, has also profoundly changed the work of machines, made data crucial for the organization of the entire process, and has also drastically changed the forms of command as automation profoundly affects management (the 'boss is an algorithm').

At this point, to read these transformations a useful strategy could begin by redefining the terms of the discourse. An attempt in this direction could be to fish from the lexicon of information technology and cybernetics in search of concepts that can productively be applied to the 'factorization' of urban spaces operated by platforms and then further tested more generally to other places of contemporary production. From this point of view, there are the concepts of toolchain or buildchain or pipeline, which are different nuances of the digital version of an assembly line where each piece of software 'takes the package' (of information) from the one before, processing and passing it on to the one after, and is applied in various IT domains as building a programme from the source code (buildchain), or analysing AI data (pipeline). Drawing on this lexicon, it seems to us that it might be intriguing, as a suggestion, to test the theme of the 'pipeline' to define the contemporary techno-urban-social entanglement. The factory-diagram moved out a discrete unit, a delimited space, as the junction of a logistical continuum. In this sense, the unbundling of the large factory on the territory that took place following the logistical (counter)revolution of the 1960s now sees movements of 're-centralisation' – i.e. in the pervasiveness of algorithmic management as well as in the large Amazonian

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What misses from this description massively adopted by critical logistics studies is precisely a focus on workers struggles. Strikes and riots occurred in the 60s were particularly vibrant everywhere. The strength of the Fordist working class was at its peak. Worldwide claims to achieve social rights threaten the order of Capitalist society. Such assumption led us to turn upside-down the perspective of a Logistics Revolution and talk about a Logistics Counter-Revolution. Indeed, from a working-class gaze «the logistics (counter)revolution is not just a technical innovation but a political reaction to class insubordination of Fordist workers and to de-colonization processes, forestalling and really building the neoliberal era. It is not coincidence that today's logistics industry is a world where countless class conflicts are arising inside the more general growing paradigm of struggles in circulation» (Into the Black Box, 2021: 24).

[6] This represented also a shift in the process of valorisation that opened up a proliferation of attempts at new definitions of the urban – above which the one that stood out was the concept of the global city coined by Saskia Sassen (2002). It indicated primarily the dominance of finance in the production system.

fulfilment centres – but within a systemic necessity that frames them as hubs of innervation of the flow of goods.

To sum up, nowadays digital platforms are setting up urban spaces as pipelines which are essentially based on a massive datification, a circulation regime and the inclusion of social reproduction into valorisation processes.

3. Circulating and algorithmic subjectivities

What we argued is that, if the formation of the urbanised territory and the factory-diagram are elements that have always co-evolved, today this techno-urban-social assemblage defines itself in a new way. The social fabric is entangled into this dynamic co-evolution.

Since the Sixties with the logistics (counter)revolution and the dismantling hegemony of the "Fordist factory" (at least in the West) emerged what has been called the 'social worker'. According to Antonio Negri and Michael Hardt, «after proletariat had become a worker, now the process is reversed: the worker becomes a tertiary worker, a socialized worker, a proletarian worker. [...] We had seen the mass worker (first massified concretisation of the capitalist abstraction of labour) producing the crisis. Now we see the restructuring that, far from overcoming the crisis, stretches and lengthens its shadow over the whole society» (Hardt and Negri 2005, 145). On the one hand, valorization processes overflowed in the whole society. On the other hand, the nature of work should no longer be considered as a function strictly linked to specific sites of production where the relationship between work and value is immediate. Rather, value is now produced as a socially mediated process. The enlargement of the sphere of production on a societal level and the subsumption of the sphere of circulation within logistics lead production brought about a new political class composition: *mass-workers* of the Fordist factory came out of the gates and became *socialized-workers*. As we argued in the previous paragraph, the affirmation of large transnational-scale production and distribution and the subsequent shift of power from producers to retailers, contributed precisely to the dislocation of the factory into the whole society. Mode of production changed; working class composition changed; labour struggles changed too[7].

From the 70s onwards, three other steps – the Retail Revolution[8] in the 80s, (Lichtestein 2010), the Dot.com Revolution at the end of 90s (Becker 2006) and the Platform Revolution (Parker, Van Alstyne and Choudary 2016) after the 2007/2008 crisis – contributed to accelerate and expand the role of circulation in the valorisation processes as well as the use of digital technologies to automatize and centralize the management. Alongside with these transformations, critical theory formulated new categories to grasp the changing patterns of living labour: the multitude (Negri and Hardt 2005) and the cybertariat (Huws 2003).

So, it seems possible to suppose that current flexible urban spaces organized more and more around pipelines are nothing other than the spatial approximation of the true nature of living labour, that is, potential labour (Mezzadra, 2023) – at the crossroad between working-time and life-time, active and inactive, hired and fired,

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[7] «The categories changed, the experience of life changed, the struggle against exploitation changed, the revolutionary project changed, the world and its alternatives changed. Firstly, because of the novelty of the subject of the struggles: social worker, social individual, intellectual labour force» (Montefusco and Sersante 2016, 19).

[8] The Retail Revolution (Lichtenstein 2010) followed Logistics Revolution by one decade. According to Bonacich and Wilson, it was «an attempt to bridge the gap between supply and demand more effectively» and it represented «a change in the balance of power between manufacturers and retail stores» (2008, 4). In other words, the retailers started told to «manufactures what consumers were actually buying and therefore what the manufactures should produce, when they should produce it, and, sometimes at what price» (Ivi 6). It was the proper beginning of the just in time to the point era which is the core of Capitalism 4.0: Wal-Mart anticipated it, pioneering starting to mine data from clients' transactions. In terms of Bonacich and Wilson «the collection of POS data put power into the hands of the giant retailers. They knew consumers were buying, which prices were most effectively synchronized sales, which products were gaining and losing popularity, and how buying patterns were differing demographically and regionally» (Ivi 8).

just-in-time and to-the-point – and therefore not reducible to definitive spatial forms (Marullo 2014). Put it differently, the *just in time and to the point* approach implemented by digital platforms drastically changed not only the spatialities of valorisation processes, but the world of labour too. Multiple new forms of labour portray Capitalism 4.0, from logistics porters to gig-workers, which are characterized by the domain of algorithmic management that brought an intensification of working performances and an extension of labour control (Lee et al. 2015) as well as by an intensive mobility. To resume, datafied and circulatory pipelines need algorithmic and circulating subjectivities.

We identify as "algorithmic subjectivities" (Into the Black Box 2021; Armano, Briziarelli, Risi, 2022) all figures of living labour whose forces are shaped through digital technologies: from the "last mile workers" who operate in urban areas delivering goods or hailing people, to cloudworkers fulfilling microtasks. Thus, platform workers constitute what we may label as *algorithmic subjectivities*: workers whose labour is mostly organized by an algorithm that lays on a rating system in order to evaluate labour performance and that adopt soft control, tracking systems or gamification to articulate and supervise rhythm of labour. They could be considered paradigmatic figures of today's capitalism where the shift from the factory-city to the pipeline seems fully complete. In the three years European project called PLUS we had the chance to interview more than 200 urban-based platform workers. As Valentin Niebler, Moritz Altenried and Judith Macannuco state, «digital technology allows for the extension of forms and practices of organization and control into urban spaces hitherto only conceivable in the disciplinary spaces of factories» (2020, 257). Platforms like Deliveroo or Uber could track through their app every single step of the workers, while in the case of Helpling or Airbnb algorithms use indirect form of control such as rating and ranking system. In the first case, there is a pervasive direct control on workers, meaning that for example if you are on your way to do a delivery and somehow you have a slow-down, immediately a message or a call arrive asking if everything is ok. On the other hand, ranking system indirectly affect your chance of working, pushing workforce to internalize forms of self-control. With a low evaluation workers see their possibilities to work decrease; and less shifts or less guests mean difficulty to climb again the rank in a kind of negative vicious circle.

All in all, algorithm management means a kind of "automatic regulation" entailing both digital and self-control, an integration of human and machine. There is no "boss in the flesh", which is, by the way, something with a double side appeal. Indeed, if it implies a blur in the "command chain" and a lack of contact person for platform workers, on the other hand it played a considerable power of attraction for many interviewees of our sample due to the "autonomy" it promises. Connected with this supposed self-entrepreneurial dimension characterizing firms like Deliveroo, Uber or Airbnb there is also the so-called "playbour dimension". More than one interviewee of our sample claimed that a factor of attraction was the possibility to «work and train at the meantime». Similarly, most of the "long-lasting hosts" remembered the sense of community and the «possibility to meet other people, travellers and guests that Airbnb gave you». Even Uber answers to similar purposes. As a matter of fact, the blur between working time and lifetime is a common feature that affect most of the platform workers which are exposed to an increasing pressure, in opposite to the rhetoric of a *leisure time job* these platform use. In this sense, not only platform workers spend an increasing (paid or unpaid) working time in the platforms, but they are also called to organize their life according to the need of the latter. The flexibility promoted by the platform, then, seems to be twisted by a specific use of digital technologies which on one hand expand capitalist control of platform workers and on the other tends to obscure the productivity of their activities. As one of the interviewees observed in Bologna: «Yeah, I was thinking, nice, I can decide the times, then you see that the times are not always available, nothing is unlocked, no sessions etc. Then you realize that it all comes from how hard you work especially on the weekends. And you realize that you work if you work on the weekends. If you don't work on the weekends during the week, you don't do anything».

Eventually, it is noteworthy that algorithmic subjectivities employed within platforms are characterized not simply by an intensification of labour through digitization, but also by an intensification of mobility. In a logistics-based capitalism, subjects at work are circulant through pipelines too. Platform labour force, as it is well showed by a copious number of recent studies, is characterized by a high *turnover*, an elevated inter- and intra-platform *mobility*, and a strong presence of migrant labour often predominant (Altenried, Bojadžijev and Wallis 2020; Altenried 2021). For instance, it is noteworthy that becoming a "platform worker" is extremely easy: it is enough to provide ID documentations and to take a job interview. Then, work will be handed out through a smartphone and organized by an algorithm: you will probably never meet nor managers neither colleagues until you chose to change the job[9]. Such feature played a considerable "power of attraction" that even increased for migrant workers with problem related with residency permit. In this sense, lean platforms are now part of a "multitude of platforms of arrival and take-off within, against and beyond the infrastructures of the state" (Meeus et al., 1), they constitute workers' mobility infrastructures, "part of the urban fabric within which newcomers become entangled on arrival and where their future local and or translocal social mobilities and produced as much as negotiated" (Meeus et al., 1).

4. Mobile struggles

Until now we have developed a potential theoretical framework for the city as a space of production and circulation under capitalism 4.0. We highlighted how production is characterized by a strong circulatory and digital dimension which organization we propose to frame through the concept of pipeline. Moreover, we underlined the effects these transformations had also on the working class, producing algorithmic and circulating subjectivities. Nevertheless, as already analysed in the evolution of the city, this is not just a one-way process.

Both theoretical and political approaches we referred to – the Lefebvrian and the Workerist – consider the territorial asset as the specific effect of the capitalist response to a cycle of struggles and the cause of a series of class behaviours. On these bases, we frame territoriality both as a means of the social organisation of production and as a site of reproduction of capitalist (antagonistic) relations. In other words: the production of urban space and territory has become, to all intents and purposes, part of the process of capital accumulation and valorisation as well as class struggle (Harvey, 2012). The capitalist metropolis does not arise from its own entrepreneurial spirit as many histories of the modern city stated. It arises primarily from the struggles, from the upheavals of the oppressed and their counterparts, that is, from the counter-revolutions, from the political and economic states of exception that capital has put in place to maintain its paradoxical order of things, that is, an order founded on disorder (Aureli, 2016). The disorder of the capitalist metropolis is thus not an 'error' of the process, a condition of default as reformist urbanism theorised. The disorder of the capitalist city is the outcome of the permanent state of (civil) war that is necessary for capital to control and force its subordinates to work. Nowadays pipelines that stretch through the urban spaces are constantly challenged by blocks, bottlenecks, disruptions as the algorithmic subjectivities they embedded struggle to circulate and organize in different and autonomous ways. Put it differently, we propose the concept of circulating subjectivities not only to describe a different technical working-class composition in capitalism 4.0 as less stationary and more fluid than in the factory regime; this concept is an attempt to grasp also the varieties of strategies and actions that living labour may actively assume nowadays. In this sense, we refer to the existing literature on workers'

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[9] Apex of such situation is that you are often even fired by email. Tragic implication of such situation occurred in September 2022 in Italy where a rider died in Florence due to an accident while he was working. Glovo fired it by email due to «non-compliance with Terms and Conditions». https://www.wired.it/article/glovo-licenzia-rider-morto-incidente-stradale/?fbclid=IwAR2aSRvbZtxP2RTUZU0I7LL6jFVOQupjlVTFl4NGg-xAjsYRzQSkTWNzxRg.

mobility power not simply in terms of employers' strategies but also workers' agency (Elliot and Urry, 2010; Smith, 2016; Ceccagno and Sacchetto, 2020)

To better explain this attempt, we may refer initially to the book *Riot, Strike, Riot* written by Joshua Clover. To sum up, the core thesis of the text is that rioting was the main form of protest in the Seventeenth and Eighteenth centuries, then replaced by the strike in the early nineteenth century. This shift, according to Clover, is rooted in the leading role assumed by productive dynamics and in particular by the factory as centre of the capitalist mode of production. Nevertheless, the riot returned to prominence in the 1970s, as deep changes occurred in the process of valorisation also affecting the role of the factory. Reformulating this proposal, we may say that one option could be to consider the social conflicts on circulation as alternative to labour conflicts in the production.

If is unquestionable that in recent years we have witnessed a differentiation of the forms of social conflict, we think it is not possible to split sharply riot and strike, production and circulation, as the latter assumed a leading role in the valorisation processes. Considering the pipeline as the organizational model for production on the territory, the point seems more to inquiry who and how may disrupt the productive flows than assuming one of the options as a paradigm. The high mobility of subjectivities – in terms of places, roles, identities – is not simply passively top-down forced but also intentionally bottom-up acted. The turnover and contingency of labour may be overturned into the fluidity and evanescence of the struggles. There is a wide spectrum of actions, individual and collective, that nowadays multiple subjects circulating though platforms may adopt. The same worker may move through different strategies, sometimes by him/herself and sometimes in cooperation with other. At the same time, conflict may arise in a part or another of the pipeline and then disappear, but its effects may cause troubles elsewhere in the flow. These disruptions undermine the valorisation as well as the circulation process.

First of all, it is possible to map a multiplicity of individual actions that workers constantly adopt to sabotage, escape or oppose the power of the algorithm or digital devices of control that revitalise a long tradition of labour unrest (Edwards and Scullion, 1982). Nomadism could be considered a strategy to place him/herself in the best position possible of a pipeline. During the first pandemic period (Pirone et al. 2020) we witnessed a general digital migration from some platforms to other, i.e. from transportation services to food delivery, as the first were suffering for the containment measures applied in all the investigated cities while the other profiting from their fundamental role in guaranteeing social reproduction. Indeed, workers constantly move through platforms or use more than one app in search of better working conditions and payment. Moreover, they take advantage of glitches and counter-uses of the technology for their own purposes (Grohmann et al., 2022). For example, recently it emerged how in the food delivery sector is quite widespread the use of boot or pirate software to obtain shifts and orders. Or platforms have to constantly update their software to adapt control to workers' misbehaviours (fake accounts, 'laziness', timing). Uber drivers reported to adopt short-term logoffs stimulating traffic through artificial orders (that are then cancelled) to avoid unprofitable offers. Deliveroo riders developed strategies of *'gaming' the algorithm* to their advantage, such as by manipulating attendance statistic. Helpling cleaners who developed a long-term relationship with customers sometimes circumvent the platform informally, as well as Airbnb hosts with frequent guests.

Moreover, beyond these fluid counter-conducts it is evident the presence of actions and strategies based on the cooperation between workers – as we will show through some examples deriving from the PLUS research above mentioned. First of all, there is an evident attempt between platform workers to build up communities of support. It is relevant the role that social media (Facebook) and message platforms (WhatsApp) had in the process of organization: they are constantly used to share information on working conditions and mutual aid. Workers supported each other about bureaucratic duties (Airbnb), shared blacklists of customers (Helpling) and traffic warnings (Uber), and sometimes collective action was launched through these groups (Deliveroo).

This circulation of information is a sort of reverse-engineering against the opacity and one-way communication imposed by the platforms through their app interfaces.

This tendency to self-organization is not limited to mutual aid and info sharing, in some cases upgraded towards the coordination for conflict actions. From a legal point of view, as said above, locality-based platforms workers are largely not employee but independent contractor (with some exceptions, like Uber sub-companies in Lisbon or Take Away riders in Italy and Spain): Strike is not formally included among their potential actions, nevertheless for this reason they can interrupt working unexpectedly without respecting the legal requirements usually asked to standard workers. On close inspection, it is the concept of strike that has changed. What does it mean for a Uber driver to strike? In his/her case would be sufficient to stop working in order to arrest valorization processes? In these years, platforms workers had been forced to experiment other forms of protest in front of the intangibility of the algorithm and the circulatory dimension of the pipeline. It is relevant that collective protests (Woodcock, 2021; Wood, Martindale, Lehdonvirta, 2021; Joyce, Stuart and Forde, 2022; Bessa et al., 2022) often take on the urban and circulatory dimension: critical mass rides, traffic interruptions, round-points blocks are all forms of struggle that aim to disrupt the circulation (of people, of commodities, of data). The circulation struggles, anyway, appear to go in parallel with counter-logistics struggles. Workers do not limit to oppose the platforms or to disrupt flows, they also aspire to or even experiment more or less clearly alternative models to the pipeline. These attempts vary from the constitution of cooperative platforms based on more-democratic principles (like food delivery Mensakas in Barcelona) and to the development of open software with a decentred management (as CoopCyle network).

Many protests had been led by informal or self-organized groups that barely were based on institutional or well-defined principles. In Lisbon, informal associations of Uber drivers have been formed in recent years to share information and debate relevant topics, while in Paris and London they entered the branches of already established rank and file unions. In Tallinn, no formal organising had taken place by the time of our field research. However, a protest against the practice of surge pricing of Bolt (then Taxify) took place in front of the company's office in 2018. Deliveroo has faced much discontent. Informal (Riders Union in Bologna, CLAP in Paris, Riders x Derechos in Barcelona) or grassroots (IWGB in London) unions have played an important role in all cities, partly because they were willing to develop strategies for organising self-employed workers and because they developed tools of labour conflict outside the established form of union-employer relationships.

It is relevant to say how interviewees reported that the knowledge about actions or organizations in other places inspired theirs too. One of the main and challenging features of these conflicts and organizations is their ephemeral character in terms of duration and stability; nevertheless, this does not prevent them from circulating constantly by the time and geography in a patchworked manner. In this sense, we may mention last two examples. The first is represented by the wave of protests sprouted more or less spontaneously in all the investigated cities during the first period of pandemic because of the lack of social protections and support furnished by platforms to workers (Workers Inquiry Network 2020). The second refer to the week of logistics strikes occurred in Italy between the 22nd and the 26th of March 2021 when Amazon drivers, food delivery riders and then logistics workers separately struck but synchronizing their actions so to empower communication and disruption.

To resume, the circulatory and algorithmic features characterizing capitalism and spaces nowadays are mirrored by the subjective forms of living labour too. Far from being only top-down imposed, circulation and data can be assumed as a battlefield for the research of personal aims or collective claims. In this multifaceted dimension of agency, alternative mobility regimes of principles of organization may arise.

5. Conclusions

The paradigm of the factory is still a powerful reference point for the analysis of capitalism 4.0. Nevertheless, some changes in the processes of valorization – and their spatial organization – force to reconsider this paradigm. The role of social relations into value production transformed urban spaces into fundamental assets for capitalist accumulation. This does not mean that the factory as specific site disappeared, rather its role has to be placed inside a more general process of factorization of society based on the dominance of logistics as principle of organization and data as resource. New forms of centralization are emerging thanks to the possibilities offered by algorithmic management in terms of granular control on scattered urban spaces. Pipelines represent a new paradigm assuming the logistical power exercised in particular by platforms to organize labour though multiple spatialities. Such perspective does not exclude the possibility of forms of neo-Taylorism inside digital labour but embed them into a different background than the one of the past. Consequently, the same subjectivities of living labour assume other features than the factory working class. The cohesion and stability of the latter has been replaced by an intensification of mobility, as well as the digital technologies does not stand more in front of the living labour but totally innervate his/her subjectivity. Nevertheless, these subjectivities are not passively enduring an algorithmic and circulating condition, they can actively exercise it with different purposes and modes, so contesting the command of the flows within the pipeline.

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