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ABSTRACT

Workers of digital platforms are managed by algorithms and then rated by customers about their work. The aim of the paper is thus to describe how technological innovation is used to manage and control digital workers, and to present to collective actors some proposals in order to negotiate algorithms and technological innovation with the purpose of improving drivers' working conditions.

In particular, the paper analyses Uber case-study and the technology employed: geo-localisation techniques for smartphones and GPS, as well as algorithms.

The paper is structured in two parts. After a brief analysis of legal cases, in the first part, it describes which technologies are (or could be) employed by the company to estimate the geographic position of users, to match supply and demand

and to control drivers in the fulfilment of their working activity. In particular, it goes in depth into some technical issues and parameters used to manage working conditions. In a second part, by adopting the results of the technical analysis as the starting point, it presents some proposals on how collective bargaining can intervene in the management of those kinds of technology to improve drivers' working conditions.

Keywords: new-economy; employment relations; management of new types of technology; algorithm and ratings; social protection.

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1. Introduction

The impact of technology on the labour market is not a new topic in the framework of the capitalist system. By technological innovation, companies enhance workers' productivity to compete in the global market; under (and in accordance with) the conditions imposed by the international competition, technology is employed in the process of production, suppressing or creating new jobs and modifying the organisation of work, its procedures and the pace of work (Cardona Rubert, 2003).

Technology is a central (historically determined) pattern of the relation between capital and labour. In spite of this, some recent analyses refer to a specific technological tool, the digital platform, to delimit a (supposedly) "new" economic and social sector: the "gig" economy (Huws U. and others, 2018; Aloisi, 2016; Prassl and Risak, 2016). Two main assumptions support this hypothesis. The first one is the supposed "new" way relations between platform-users are managed (Degryse, 2016; Parker and others, 2016). The second one is the rapid development of virtual markets where users exchange information, goods and services, by web-applications and Big Data (Rifkin, 2012).

In that framework scholars distinguish two main types of work in the platforms: crowd-work and work-on-demand via app (De Stefano, 2015; Valenduc and Vendramin, 2016). Crowd-work is a form of job-sharing – employed for freelancing (short translations, audio transcription) or software development –

where a group of workers (named "crowd") develops micro-tasks posted online and is paid only after the platform's review (Silberman and Irani, 2016; Howe, 2006). Work-on-demand via app is a form of job-on-call in which workers fulfil a traditional activity (transportation, cleaning, running errands, clerical work), by means of platform intermediation between clients and available workers with mobile applications and geo-localisation systems.

Regardless of the classification proposed and its signifiers (that we reject), what can be underscored is that companies employ new technologies to catch clients in the market, match supply and demand and manage labour relations, in order to compete in the global market under the conditions required (as all the companies do).

This paper focuses precisely on how technologies and algorithms are used to manage labour relations, with the aim to stress how collective bargaining is the best way to achieve better working conditions for platform workers. It particularly focuses on two main issues. The first one regards the technological challenges workers' representatives face on when negotiations require going into the software code and seek the negotiation of the algorithm parameters; it also implies a consideration on how trade unions are coping with the need to master such skills and how it affects their structure and mission. The second one is the role of collective actors in representing digital workers and the organisational challenges they face, deepening into the difficulties of organising workers which are dispersed – some of them with no work-place – and recognised as employees in some places and still independent in others.

The starting point of the analysis is the case-study of a transport company, Uber, which we have chosen for two main reasons: the central position in the market, based on low wages and transaction costs (Rogers, 2015), and the judicial cases of misclassification in which it was involved – in particular, the preliminary ruling at the European Court of Justice[1] and the case-law at the Employment Tribunal of London[2], whose statement was confirmed in the appeal decision[3] –. A brief analysis of this case-study can clarify how management powers are exercised by using technologies and algorithms, as a preliminary step to intervene.

[1] ECJ case C-434/15 (Asociación Profesional Elite Taxi v. Uber Systems Spain, SL.).

[2] Case-law n. 2202551/2015 (Mr. Y.Aslam, Mr.J.Farrar&others vs. Uber B.V., Uber London and Uber Britannia).

[3] Judgement of the Employment Appeal Tribunal of London (Appeal n. UKEAT/0056/17/DA).

2. The management of labour force by algorithms. Misclassification in the case of the Uber platform.

Companies employ algorithms to manage and oversee workers on a large scale. The exercise of employers' power of control is indeed one of the major issues that Courts have discussed in legal cases on drivers' misclassification.

After conceiving Uber as a transportation company (Górriz López, 2015), the European Court of Justice[4] and some national Courts have gone in depth into a second question: whether drivers are independent contractors or they are employees/workers. As we will see in Section 6.3, this element is particularly relevant when it comes to the aim of achieving a collective agreement and applying its regulation to all workers, considering that in many countries collective rights are only recognised to employees.

According to the Employment Tribunal of London, confirmed in appeal (Trillo Párraga, 2017), drivers are not autonomously organised, being Uber who places the service on the market and adopts business strategies (as the geographical and catchment area, the time slots and the surge price)[5] to get profits from it. Three main points are analysed in the UK case.

Firstly, through the platform, the company recruits drivers with specific requirements which it defines: for example, a driving licence for at least one year, a standard vehicle with previously defined usage conditions, a proof of insurance (and in most cities, a car inspection).

Secondly, throughout the labour relation, the company gives precise instructions about time, place and fulfilment of the service, the route and the code of conduct that drivers have to respect (Ginés I Fabrellas and Gàlvez Duran, 2016, 22; Todolì, 2017). Furthermore, it determines the working conditions (Prassl and Risak, 2016) and fixes the wage according to criteria which are converted in algorithm parameters, as covered distance, time, location and service demand (Rosenblat and Stark, 2015).

Thirdly, Uber has the exclusive control of the organisation of the service. All interactions between clients and drivers are managed by the platform. By using GPS data, it receives and controls the localisation of vehicles (and riders) and assigns the trips, taking into account the star rating: it assigns better tasks to the drivers with the

[4] The question, referred to the ECJ by the *Juzgado de Mercantil n. 3 de Barcelona*, concerns the classification of Uber's activity in light of EU law. The ECJ determines whether such business should be considered merely technological intermediaries or transportation service providers; in the latter case, which prevailed, they would be subject to the national regulations of transport services of each individual EU Member State.

[5] Uber Terms and Conditions, point 4 (last access 03.03.2018).

highest marks or deactivates the accounts of the workers with the lowest ones (Rodríguez Fernández, 2017).

Thereby, technology has a primary role in both, managing labour relations and drivers' working conditions. In the following section we will describe further which technologies are employed to estimate users' geographic position, to match supply and demand and to control the performance of the service and of drivers. By adopting the results of the technical analysis, in a second part, we will present some proposals on how collective bargaining can intervene in the management of technologies to improve drivers' working conditions.

3. Technological challenges. Matching transportation demand and supply in the Uber platform.

New technologies are employed in platforms whose service strictly depends on mobile devices, internet connection, data mobile network (3G, 4G/LTE, 5G, etc.), and geo-localisation system. In order to estimate the geographic position of a user owning a smartphone, outdoor wireless localisation of a mobile object is generally needed. GPS (Global Positioning System)[6] is the most efficient positioning technology and it is generally included in a device in medium price range; since smartphones usually have relatively low cost GPS chips, the performance of locating accuracy is highly dependent on environmental and external factors (Hwang and Yu, 2012).

Geo-localisation is a fundamental input for the Uber system too, in order to match supply and demand. On the one hand, the customer who sends a request for a ride also has to specify the pickup location, which is usually his current position. On the other hand, the driver, who has a different kind of account, simply has to tap Go Online in his Uber App on the smartphone in order to become available to pick up customers, and he will automatically receive trip requests in his area.[7] In both cases geo-localisation is needed, generally by means of GPS chip of the smartphone. Then, in few seconds the platform matches the customer's request for a trip with the driver, who is chosen among the available ones in a local zone.

[6] It is a geo-localisation system that uses a network of artificial satellites, that is employed to define the geographic coordinates (latitude, longitude, altitude) of any place on Earth. Anyway, GPS measures are affected by errors that cause non-exact precision; according to the US Department of Defense (2008), planimetric error has size of about 10 metres, while altitude error has size of about 15 metres, at 95th percentile and in standard conditions.

[7] Uber Website, http://www.uber.com (last access, 03.03.2018).

Anyway, Uber does not specify how the matching process exactly works, partly because it is a company's strategic asset. That is why we can only present some hypothesis of how it can work.

In the following figure it is reported an example of a potential situation (how the matching process could work), with a trip request of a user who indicates also his pickup location and the four available drivers nearby. Their positions are displayed in the local graph – whose links are bidirectional – which represents the local urban road network.

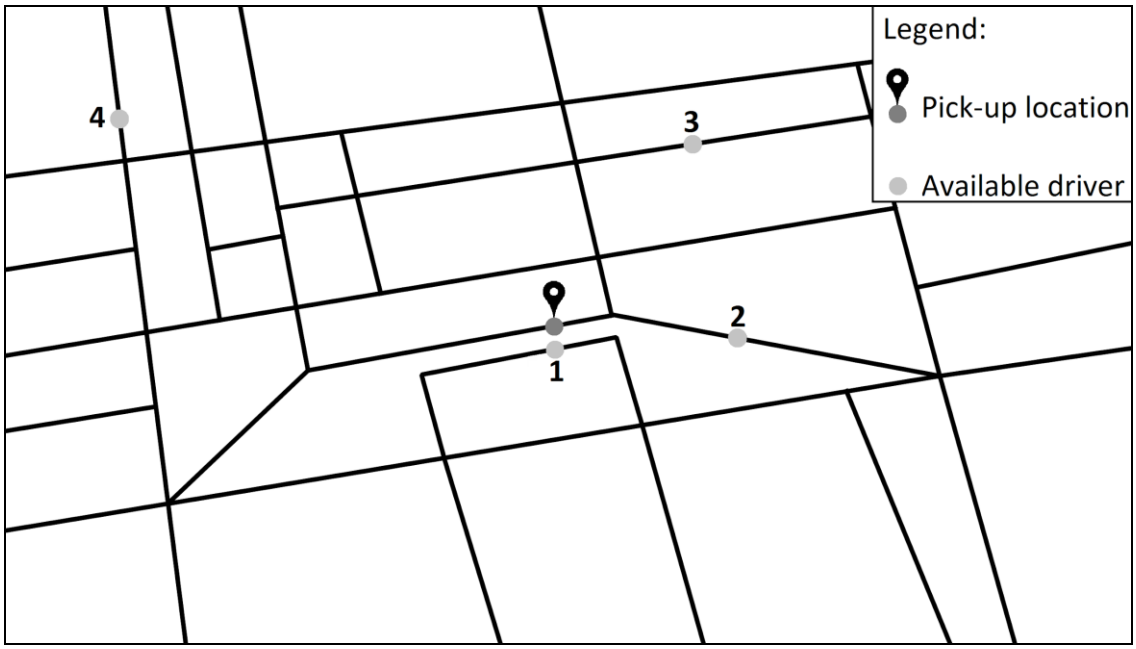

Figure 1: example of local graph and locations of pickup and of available drivers

A very easy way to match passenger and driver could be to identify the closest driver, as the crow flies (driver 1 in figure 1). This method, however, can lead to significant errors depending on the actual road network topology, that is not taken into account, with a considerably higher waiting time for the customer as the result. That is the case reported in the example of figure 1.

Alternatively, since available drivers' positions are always known by the control system, the distance on the road network between the customer and each driver can be reckoned.[8] In the matching phase, calculation could be performed, for example, by freezing drivers' position only in the local area of the request (spatial

[8] For instance, with the availability of a local graph and of links' cost – whose set constitutes the network – a shortest path algorithm, like Dijkstra's algorithm (Dijkstra, 1959) or A* algorithm (Hart et al., 1968), can be used.

simplification) in the time instant of the request (points' steadiness requirement), and by using, if necessary, a less complex road network (network simplification that allows to reduce significantly computational time) in order to quicken this step. Different attributes (distance, estimated travel time, etc.) can be taken into account in link cost calculation, and consequently in path cost calculation too, whose value is obtained by the sum of the cost of the links constituting the path. The driver chosen for the pickup can be selected, for instance, as the one with the minimum cost path from the customer, in terms of distance (driver 2 in figure 1), estimated time (driver 3 in figure 1, if he has the minimum travel time because driver 2 is stuck in a local traffic jam), or a combination of these attributes, in order to decrease customer's waiting time.

Nevertheless, we really don't know how matching algorithm works. Some Uber drivers seem to be reluctant to trust it, as they argue that it generates ride requests by considering distance from one another and previous history of being matched (Page et al., 2017). Lee et al. (2015) argue that other factors, such as passenger-driver mutual rating and driver login time, could be factored into the algorithm in addition to passenger-driver distance. Moreover, the assignment algorithm penalises drivers' rejection of passenger requests, which lowers drivers' acceptance rates (Lee et al., 2015). Also in Rodríguez Fernández (2017) it is highlighted that digital platforms rank their workers and benefit or disadvantage them, by excluding them from the best opportunities, on the basis of their star ranking. In these cases, some subjective elements should be introduced in matching algorithm, for instance by inserting a penalty to the driver as an individual attribute while his estimated distance from the customer, previously presented, is evaluated by means of mathematical objective data only. Therefore, in the example presented in figure 1, the requested trip could be assigned also to driver 4 even in the case of an uncongested network.

4. Technological challenges for workers' representatives

By using Uber as case-study, we propose some points on possible strategies and actions of trade unions on technological challenges, aimed at negotiating an agreement on algorithm parameters, especially at company level, as well as at improving drivers' working conditions. In particular, the following points are analysed: deactivation by low rating, deactivation by cancellation and acceptance rate, time to accept the request and time to wait for the passenger, earnings, and surge pricing. The point is that all elements are now decided by the company, which defines the parameters of the algorithms, whereby in our proposal they have to be

negotiated in a collective agreement since they are directly or indirectly linked to workers' income.

- *Deactivation by low rating*. After every trip, drivers and riders rate each other on a scale of one to five stars, as a feedback on the trip. The driver's rating is based on the average of the number of post-trip stars evaluation, up to the last 500 rated trips or the total number of rated trips, if less than 500.[9] There is a minimum average rating to reach, that is unknown to drivers, under which the driver's account can be deactivated. The minimum average rating is different in each city, officially because «there are cultural differences in the way people in different cities rate each other».[10]

We suppose that the minimum threshold could be a pre-set value (for instance 4.0 stars) or a value depending on local drivers' ratings, such as the average value of the average ratings – which would be a tough requirement to meet – or a low percentile of the statistical distribution of the average ratings (for instance the 5th percentile, which means that the 5% of the drivers with the lower rating can be logged out of the app). In both cases, however, identifying a threshold is a highly subjective choice, not only because of the human nature of the decision-maker (the manager of the company), but also because the rating itself is expressed by other human beings and affected by race, religion and gender biases (Kullmann, 2018; Rogers, 2015); in this way the algorithms are exactly as racist or sexist as the customers doing the rating (Dzieza, 2015). Some workers' complaints in ratings involve transparency about what they are being rated down for, the ability to protest ratings they felt were unfair and better education for customers about ratings meaning (Dzieza, 2015, Lee et al., 2015).

Moreover, when the average rating falls below the minimum, drivers are asked to successfully attend training classes, named quality improvement courses, in order to regain access to the account.[11] The same considerations about threshold value and subjective evaluation, presented in the previous issue, can be expressed.

- *Deactivation by cancellation rate (number of cancelled trips divided by the total number of accepted trips)*. A cancellation is when a trip request is first accepted and then cancelled by the driver. Each city has a maximum cancellation rate, based on the average cancellation rate of drivers in that area. It is specified that high-quality drivers typically have a cancellation rate lower than 5%.[12] Since cancellation is a very harmful occurrence for the company's reputation, two different criteria, both

[9] Uber Community Guidelines, http://www.uber.com (last access 03.03.2018).
[10] Uber Community Guidelines, http://www.uber.com (last access 03.03.2018).
[11] Uber Community Guidelines, http://www.uber.com (last access 03.03.2018).
[12] Uber Community Guidelines, http://www.uber.com (last access 03.03.2018).

effective, are explicit: the local average cancellation rate and a maximum value of 5%.

- *Deactivation by acceptance rate (number of accepted trips divided by the total number of assigned trips)*. Although it is explained that not accepting trip requests does not lead to permanent loss of a driver's account, it is also specified that declining trip requests in a consistent way leads to being logged out of the app, assuming that the driver just does not want to accept more trips.[13] Some interviewed drivers confirm that declining too many trips leads to the threat of having their accounts closed (Page et al., 2017). Sometimes, if a driver has an acceptance rate below a certain threshold, he is encouraged to raise his acceptance rate through occasional promotions that offer a guaranteed hourly pay (Lee et al., 2015) in this case the threshold value is not indicated either, thus leading drivers to accept as many assignments as possible (Lee et al., 2015).

- *Available time to accept the request*. It is about ten seconds, although an interviewed driver revealed it really was about 6 seconds (Page et al., 2017). And yet, it should be highlighted that the driver is not aware of the passenger destination, and therefore of the possible earning, until he accepts the request and picks up the rider.

- *Available time to wait for the rider*. It is about 5 minutes, but in the case of UberPOOL drivers, admittedly they would wait for 1-2 minutes maximum, in order not to hurt the customer who is already on board (Page et al., 2017).

- *Earnings*. Earning system is based on a rate depending on time spent on the trip [€/hour] and distance travelled [€/mile], with a minimum base rate for a ride. All rates are different in each city and widely varying, but fixed by the company.

- *Surge pricing and demand-supply management*. Sometimes, especially during large events, pricing of specific local areas is dynamically modified in order to match travel supply and demand. This is known as *surge* pricing when there is an extreme shortage of drivers compared to the number of riders making requests in that area (Page et al., 2017). It is confirmed by the Uber website too.[14] Surge-priced areas are showed in-App by using different colours in the map (Lee et al., 2015).

Furthermore, when the surge is particularly high, drivers receive text messages urging them to sign on and go to the surge area (Page et al., 2017). This process probably involves market analysis, live-monitoring and forecasting of travel demand, and economical considerations on demand-supply equilibrium. In particular, in Uber platform live monitoring is made possible by controlling trip requests and drivers available in a local zone.

[13] Uber Community Guidelines, http://www.uber.com (last access 03.03.2018).

[14] Uber Website, http://www.uber.com (last access 03.03.2018)

For what concerns travel demand estimation, two different techniques are usually applied: either direct estimation or model estimation. The former involves surveys presented to a representative random sample of users and inferential statistic tools; historical analysis of travel demand data concerning Uber customers can also be a helpful tool. The latter involves mathematical relationships, based on socio-economic and transportation system attributes, weighted by parameters. Models need to be specified, calibrated and validated, and be able to forecast future demand too. Transportation supply is usually arranged on the basis of estimated travel demand.

However, some drivers complain that the ride request algorithm often works against the incentives and surge pricing: they believed they could determine the price and location where they wanted to drive, but are unable in reality (Page et al., 2017). Furthermore, being in the surge area does not guarantee requests from within the surge area (Lee et al., 2015). These statements could imply a subjective modification on matching algorithm, depending on the individual characteristics of the driver, like his rating, as already expressed in Section 3.

5. Trade-union strategies for the negotiation of algorithms and ratings

In this section we present some proposals on how collective bargaining can intervene to improve drivers' working conditions, by adopting as starting point the results of the technical analysis.

We analyse three main points related to Uber case: rating, transparency and technical and procedural contents that could be included in a collective agreement.

5.1 Collective regulation of ratings

The importance of rating is huge, since it probably defines the trips assignment and the allocation work, the price of each rate (i.e. the wages), and also the possible deactivation of worker's account. Thus the issue is not only its computation, but also how algorithms are used to dismiss or deactivate workers; and that is why we propose to intervene in technical outputs in order to protect drivers from discrimination and automatic dismissal (as we will see also in Section 5.3). Indeed, technology is designed by the humans behind it.

In order to prevent drivers from discrimination, a first challenge could be to identify and remove those ratings that can be considered clearly discriminatory.

In cases of very low rates, Uber App could ask the customer to explain them in a written motivation. In addition, some simple statistical tools can be involved in an automated process. The average rating could be calculated by considering only ratings in a confidence interval, so as to exclude extremely low rates that, in relation to the average rating of the driver, most likely are intentionally discriminatory.

In order to explain it, in figure 2 we report a hypothetical set of a driver's star ratings, collecting 500 ratings. In our scenario, two third of passengers have been fully satisfied and they rate 5 stars, while almost everyone rates 4 or 5 stars (91%). Only a small percentage of customers (5%) rates 1 star, an extremely negative judgment compared to the large majority of the riders, and likely intentionally penalising for discrimination reasons.

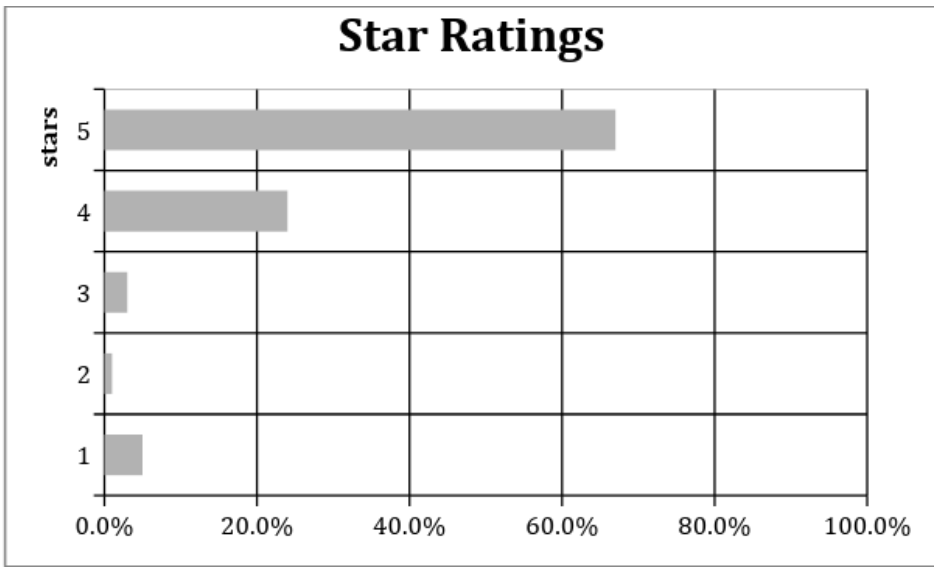

Figure 2: hypothetical set of star ratings of a driver

Statistics are reported in table 1. The average rating x is 4.47 stars, with a standard deviation σ of 0.99 stars, calculated on the basis of n=500 star ratings. A corrected average rating could be calculated by taking into account only ratings that are internal to the interval $x\pm2\sigma$ (or $x\pm3\sigma$) and excluding ratings which are very far from the mean value in relation to the standard deviation of the rating set. In the former case, ratings of 1 or 2 stars are excluded and the corrected average rating is 4.68 stars (+0.21 compared to the average rating x); in the latter one, ratings of 1 star are excluded and the corrected average rating is 4.65 stars (+0.18). Alternatively, a trimmed mean can be calculated with the same purpose, by cutting off a percentage a of the star ratings, assuming that a is the percentage of ratings affected by biases in a bad or good way. The $(a/2)\cdot n$ lowest ratings and the $(a/2)\cdot n$ highest

ratings are cut off for symmetry reason. For instance, with a=10% and n=500 (total number of star ratings), 50 ratings are cut off (the 25 lowest ones and the 25 highest ones), and the trimmed mean is calculated by taking into account the remaining ratings. In the reported example, the trimmed mean with a=10% is 4.63 stars (+0.16 compared to the average rating x), while the trimmed mean with a=20% is 4.71 stars (+0.24).

Total number of star ratings n	500
Average rating x	4.47
Standard deviation σ	0.99
x - 2σ	2.50
x + 2σ	6.44
Corrected Average Rating (2σ)	4.68
x - 3σ	1.51
x + 3σ	7.43
Corrected Average Rating (3σ)	4.65
Trimmed mean (a = 10%)	4.63
Trimmed mean (a = 20%)	4.71

Table 1: statistics of the star rating set

These easy techniques can prove helpful in order to obtain more truthful indicators when we encounter some extremely negative (or positive) judgments that are totally conflicting with the large majority of the customers, but heavily weighing on the driver's rating. Indeed, they both give a rating that is significantly higher (or lower) than the simple average rating, when there are many high (or low) star ratings and few low (or high) ones. Obviously, a large enough set of data, statistically significant, is needed. Instead, it is much more difficult to statistically identify biased ratings when they are not so extreme in relation to the whole set of ratings for the same driver.

5.2 Transparency duties and examples of crossed data analyses

Information on the whole process, on the data collected during the labour relation and their possible usage (Alvino, 2016) should be accessible to workers and to collective actors.

Although companies may be unwilling to share the mechanisms of their assignment algorithms – as they might be patented or included in proprietary assets

and property interests – more detailed knowledge about it can create favourable workarounds (for example to avoid less economical rides for drivers) and can also improve workers' trust towards the algorithmic information (Lee et al., 2015; Donini 2015).

In particular, we consider absolutely critical to know how the matching algorithm exactly works and if the driver-passenger proximity criteria, in terms of road-network distance or estimated time, is actually respected. Furthermore, minimum values of rating and acceptance rate, maximum value of cancellation rate and earning rates should be accessible. In addition, information on passenger destination should be opened to workers in order to better evaluate whether to accept or not the trip request.

Company database anonymously including drivers' rating, cancellation and acceptance rates should also be opened to collective actors. Its availability could allow in-depth and crossed data analyses to estimate threshold values and negotiate the fairest ones: for example, statistical distribution of rating and rates, possible relationships among them and their effect on deactivation. It should be highlighted that while star rating is a subjective value, depending on passengers' judgment, cancellation and acceptance rates are objective data, depending on the driver's decisions, although the driver has not acute awareness of all the information about the requested trip.

Under the hypothesis – deducible from Uber website and from some works reporting drivers' interviews or opinions (Page et al., 2017, Lee et al., 2015, Dzieza, 2015) – that rating, acceptance and cancellation rates are for each driver the determiners of the deactivation of his account, and in particular, considering that a low rating or a high cancellation rate leads to deactivation, the following table can be extracted. It is symmetric and the conflicting inputs have been cut off, with the symbol [X]; low/high values are related to the respective thresholds. We calculate that, as a result of the values of each driver, the driver can be deactivated [Fired] or not [Ok], while with the symbol [?] we indicate that the output cannot be determined.

		Rating		Acceptance rate		Cancellation rate	
		Low	High	Low	High	Low	High
Rating	Low	Fired	X	Fired	Fired	Fired	Fired
	High		?	?	?	Ok	Fired
Acceptance rate	Low			?	X	?	Fired
	High				?	?	Fired
Cancellation rate	Low					?	X
	High						Fired

Table 2: probable effects of rating, acceptance rate and cancellation rate on deactivation

Examining probable effects of ratings and rates on deactivation, we consider that rating and cancellation rate have the main impact on the company's decision, while the acceptance one seems to have a less significant role for deactivation. Thus, in a collective bargaining we suggest to focus on threshold values, especially for rating (minimum threshold) and cancellation rate (maximum threshold) in order to negotiate more favourable values for workers. In addition, with the aim of a more precise evaluation and a better negotiation, we propose to compare the percentages of deactivation for each combination of issues (rating, acceptance rate, cancellation rate), to discover their relative weight and the one which would be most relevant.

For instance, let it be y the percentage of deactivation with low rating, but high acceptance rate and low cancellation rate. Let it be z the percentage of deactivation with high rating and high acceptance rate, but high cancellation rate. If $y > z$ in a considerable way, the first case is more significant and the main issue is to discuss the minimum rating to achieve, which is too high for the drivers; so that, a collective bargaining should aim at lowering it.

5.3. Collective regulation and trade-union implication to limit employer's power to deactivate (dismiss) workers

Collective agreements should guarantee to trade unions the control of technological paths in order to improve drivers' working conditions. We emphasize the importance of establishing a stable presence of a work council (or trade unions representatives) in order to guarantee a permanent control on the exercise of the employer's power and on the respect of the conditions previously established in the collective agreement[15].

In accordance to ILO Conventions n. 87 and 98, workers should exercise the fundamental rights to previous information and consultation and the right to open negotiations for a collective bargaining. Collective actors should have a guaranteed access to all information on technical procedures and company database, for example when it comes to matching algorithm parameters, deactivation thresholds, acceptance, cancellation and earning rates; asymmetries in information between labour and management produce inefficient social outcomes and must be overcome.

According to the contents of a collective bargaining in the matter of technological innovation and working conditions, we remark the importance of a negotiation on some threshold values (deactivation, acceptance and cancellation rates, as well as the time to accept the request of a trip), as they affect drivers' working conditions and represent the most significant restrictions for them.

Moreover, we consider that collective agreements should also intervene in dismissal and disciplinary powers, in order to establish compelling procedural rules to make the right to a fair trial effective and to protect workers from unfair or discriminatory dismissals. On this sense, the right to be heard and the respect of the adequacy and proportionality of disciplinary measures, according to workers' conduct, could guarantee workers from illegal employer's measures.

In case of a potential driver's conduct which could be charged by a disciplinary measure, we propose the introduction of a compelling clause to have previously informed both, the worker and trade union representatives (or, alternatively, the work council) about the low rating, before putting it into action. A special committee, composed by the company and workers representatives, could be constituted in order to verify potential disciplinary responsibilities, guaranteeing a

[15] Collective agreements should also introduce a specific regulation of working hours, in accordance with the legal framework, and specific limits to maximum weekly working time, night work and minimum rest periods, guaranteeing to workers the right to disconnect. They should also include the matter of occupational health and safety, with rules on the prevention of occupational risks, the protection of health and safety, the elimination of risk and accident factors in the specific sector.

worker's right to be heard and the assistance of a trade union representative. Additionally collective agreements could establish procedural rules in the interest of guaranteeing a written notice with the relative claim and the worker's audience before the application of the disciplinary measure, a special committee composed by representatives of CEO and trade unions (or of the work council) and a negotiated code of conduct specifying infractions and correlative sanctions and inspired to the principle of proportionality.

Finally, trade union pressure could intervene also on salaries and earnings which should be as objective as possible, for instance negotiating better wages and earning rates (to miles and time).

6. Organisational challenges for trade-union representatives

6.1 Some examples of trade-unions multi-level coordination

Negotiating coding in a hypothetical collective bargaining requires collective actors with the bargaining powers to define it. A preliminary question is therefore the state of trade union representation: while the buds of restating the status of Uber drivers as employees appear in the last two years, organising and representation are even more embryonic.

In this regard, it could be useful to firstly describe some collective initiatives in the framework of atypical forms of work, and particularly in gig-work, as well as analysing forms of coordination between different levels of workers' representation, at local, sectorial and international level, in response to capital movements and transnational companies.

On the one hand, new independent trade unions are arising: IWGB (the Independent Workers Union of Great Britain), which organised Uber drivers' protests, IWA (the International Web Association), the Italian ACTA (*Associazione Consulenti Terziario Avanzato*), and *Teamster Union* in the US[16] (Lassandari, 2017). On the other hand, traditional trade unions are approaching gig-workers at sectorial level. For instance, two German trade unions, *IG Metall* and *Ver.di.,* created two

[16] Teamster Local 117 represents 16500 men and women at 200 employers across Washington State. Its campaign "Raise Up. Make Uber Jobs good jobs" focuses on earning a living wage and minimum standards. Information is available on its official website https://www.teamsters117.org.

Trade-off between worker-run organisation and local unions is carried out; for example, in transportation the Teamster Union has been supported by the *App-Based Driver's Association* (ABDA) and the *Western Washington Taxicab Operator's Association* in expressing workers' voice.

platforms[17] where crowd-workers exchange information on working conditions and enter into a critical dialogue.

In transport sector examples of social dialogue and collective bargaining are developing. The Swedish transport trade union *Svenka Transportarbetareforbundet* and the company *Bzzt* signed a new collective agreement in transport services. The Austrian transport and service union *Vida*[18] supported the constitution of a work council, called *Betriebstrat*, to represent *Foodora* riders in Vienna, with the main goal to negotiate an agreement on couriers' working conditions.

At general level, trade union confederations are still working on proposals to better approach gig-workers, although they are still far from this goal; for instance, the trade union confederations CGIL and CCOO are developing Projects 4.0 on the regulation of gig works and the development of social dialogue[19] (Faioli, 2017).

At European and global level, some trade unions are also compelling transnational cooperation and social dialogue with gig-economy platforms. ETUC impels towards social dialogue with trade unions, especially worried for precarious work of crowd-workers, and endorses the regulation for gig-work in the framework of EU initiative on the European Social Pillar[20], especially in the field of social protection and the employer's obligation to inform employees of the conditions applicable to the contract or employment relationship (European Commission, 2017)[21].

[17] The German Metalworkers' Union (IG Metall), the Austrian Chamber of labour (AK, Arbeiterkammern), the Austrian Trade Union Confederation (OGB) and the Swedish white collar union Unionen have created a platform, called Fair CrowdWork, which collects information about crowd work, app-based work, and other platform-based-work from the perspective of workers and unions. The site also offers rating of working conditions on different online labour platforms based on surveys with workers. The web-site of the platform is http://faircrowd.work.

[18] In Austria works councils have legal rights to information and consultation on major business decisions. The information is available on the trade union platform Fair Crowd Work, where OGB also takes part, the Austrian Trade Union Federation, to which "Vida", the Transport and Service Union, is affiliated.

[19] CGIL "Progetto lavoro 4.0. Primo report di attività. Italia 2030. Per un'innovazione socialmente sostenibile", cit. CCOO Report "Resumen propuestas de actuación sindical. Industria 4.0. Una apuesta colectiva" is available at http://industria.ccoo.es/3726499875c9feb2f83c5e2d866a4a0d000060.pdf

[20] More information is available at https://ec.europa.eu

[21] The possible revision of Directive 91/553/ ECC on an employers' obligation to inform employees on the conditions applicable to the employment contract, known as the Written Statement Directive, is one of the initiatives announced in the framework of the Pillar. The proposal to revise the Directive aims at improving workers' clarity on their contractual relations and, by ensuring this protection to all workers, irrespective of the type of employment relationship, including those in atypical and new forms of work.

UNI Global Union[22] – representing more than 20 million workers from over 900 trade unions in skills and services – and a network of Central Europe and North America trade unions are pursuing this goal too. In particular, in the Frankfurt Declaration[23] they impel towards a union strategy of universalization of some core-labour standards to all workers, independently of their contractual status: the right to negotiate collective agreements, in accordance with ILO Labour Standards; to receive at least a minimum wage according to the applicable jurisdiction (or, in jurisdiction with no minimum wage, the wage specified in the relevant collective agreement) for their work; the access to social protection (such as unemployment insurance, disability insurance, health insurance, pension, and compensation in the event of work-related illness or injury).

6.2 Dilemma and strategies for a universalization of labour rights

The initiatives previously described have faced nevertheless many obstacles thus far for many reasons.

Firstly, atypical and precarious jobs make workers' representation much more difficult: the fragmentation of the workforce (Rogers, 2015), its rapid turnover and the difficulties for trade unions to establish sustained relationships and to reach and organise gig-workers according to traditional collective strategies have to be considered (European Parliament – Directorate General for internal policies, 2017, 72). That is why this workforce has low level of unionisation and is less likely to have the bargaining power to negotiate working conditions, rights and income levels (ILO, 2016b).

Secondly, union organisation in the workplace is extremely fragmented in gig-works. On the one hand, in many countries collective rights are recognised only to employees (European Parliament – Directorate General for internal policies,

[22] UNI Global Union "Report on the future world of work", available at www.thefutureworldofwork.org.

[23] The Frankfurt Paper on Platform-based work (or Frankfurt Declaration) is a joint declaration regarding Proposals for platform operators, clients, policy makers, workers, and worker organisations. Participating organisations are the same trade unions which signed the platform Fair Crowd Work: Austrian Chamber of Law (Arbeiterkammer), Austrian Trade Union Federation (OGB), Danish Union of Commercial and Clerical Workers (HK), German Metalworkers' Union (IG Metall), International Brotherhood of Teamster Local 117 (USA), Service Employees International Union, and Unionen. The text of the Declaration, signed on the 6th December 2016, is available at IG Metall web-site.

https://www.igmetall.de/docs_20161214_Frankfurt_Paper_on_Platform_Based_Work_EN_b939ef89f7e5f3a639cd6a1a930feffd8f55cecb.pdf.

2017, 72). This makes much more difficult to create connections between works councils and trade unions, which should be strengthened to organise collective actions, negotiation and conflict. The workplace is indeed a strategic level to mobilise workers and support industry collective action (Rogers and Streeck, 1995). On the other hand, the lack of collective guarantees creates the conditions for paternalistic unions hampering genuine collective actors, as the Uber case demonstrates[24].

Lastly, international markets and competition on a global scale, based on cutting labour costs, make local initiatives ineffective and impel towards a global approach to workers' rights. Indeed, if the platforms act at supranational level (Uber, for example, operates in 81 countries[25]), cooperation between trade unions at national and international level is critically needed in order to build a framework of workers' rights at global level (Lassandari, 2017). On this sense, a first step could be impelling for an international framework agreement (IFA) with management, as a collective tool to recognise core-labour standards to all drivers (at least the pillars of decent work). The constitution of World Works Council at transnational level, as a workers body with rights to be informed and consulted on the progress of the business and any significant decision for their working conditions, is most worthy. Despite this, the impediments to extend core-labour standards to all atypical workers, independent contractors, workers of subcontractors or temporal agency workers are simply huge. To the obstacles previously described, it has to be added that international framework agreements only bound the signing parties, both on the worker and on the company side (Baylos Grau, 2005). So that, they cannot be extended neither to that subcontractors which refuse to adhere to them, nor to independent contractors and to some forms of atypical workers, making the control of the global supply-chain extremely hard (ILO, 2016a).

The recognition of legal and collective labour rights to atypical workers (and particularly to gig-workers) is thus hampered by their contractual status, according to the applicable legal systems, to Court statements and arbitration clauses avoiding misclassification sentences. Social protection and labour rights have been designed

[24] Uber recently entered into a Settlement, under whose terms it will continue classifying its drivers as independent contractors and it agrees to help create an Uber "drivers association" in both California and Massachussetts. The settlement makes clear that the company won't view the association as a labour union, nor will it grant it "the right or capacity to bargain collectively with Uber. But drivers will elect leaders of the association, who can discuss drivers' concerns "in good faith" with Uber management. The settlement also establishes that "Uber will provide some funding to the Driver Association to pay for incidental expenses (phones, printing, meeting space) and to carry out its basic functions".

[25] As reported in Uber website: https://www.uber.com/en-ES/country-list/ (last access 5.05.2018).

on the grounds of standard form of employment, as a concrete activity of a worker defined in a precise society by a specific mode of production, and this has left non-standard workers with patchy coverage (Riesco-Sanz, 2012). The major obstacles to the universalization of labour rights remit thus lastly to the same labour law architecture.

6.3 First attempts for an approximation of atypical workers to standard employees?

Despite the obstacles to the universalization of labour rights, some attempts to overcome it and its main obstacle (the recognition of labour rights on the grounds of employment contractual status) have to be registered, although in this paper they can be treated only as conclusive remarks.

For instance, the same definition of employee has been submitted to broader interpretations in many legal systems (Spain and Italy for example) in order to enlarge the scope of the application of employees' rights and guarantees. The same European Parliament underlines the precariousness and insecurity risks of atypical jobs and "the risk that new forms of employment emerging in the context of digitalisation and new technologies might be blurring the boundary between dependent employment and self-employment"; that is why it calls on member States to take into account ILO indicators to determine the existence of an employment relationship (European Commission, 2017).

At the same time, in some European countries some of the guarantees recognised to standard forms of employment have been progressively extended to some atypical workers (in Spain to TRADE workers, in Italy to "lavoratori parasubordinati" and recently to "collaborazioni coordinate", introduced by article 2 dlgs. n. 81/2015), jointly with social and collective rights, for example for freelancer, workers in UK, economically dependent, self-employed workers in Spain (European Parliament – Directorate General for internal policies, 2017; Perulli, 2015; Santoro Passarelli, 2013; Goerlich Peset 2009; Trillo Párraga, 2008).

At European level, the revision of EU law in the framework of the European Social Pillar proposes to enlarge social protection to all workers, regardless of the type of employment relationship, including those in atypical and new forms of work (European Commission, 2017).

Finally, at international level, a recent ILO Report (ILO, 2016b) proposes different approaches to include non-standard workers in the collective bargaining process; for instance, by recognising them legally the right to organise or bargaining

collectively, facilitating the capacity of unions to be considered representative in sectors employing a high proportion of non-standard workers, and promoting actions to organise and collectively represent workers in non-standard employment.

All these elements, which can only be treated briefly in this paper, would suggest that atypical forms of employment are eroding the principle of employment stability on which labour law has been built as well as hampering the access to legal protections and rights recognised in collective agreements to an increasing number of workers, altering the coherence of the whole theoretical labour law model.

The attempts of approximating atypical workers to standard employees with regards to some of the protections and guarantees of standard employment can be actually read as that lever which seems to be currently transforming that model. It could be interpreted as the first step of a process of socialisation of those rights and conditions that originally were circumscribed only to a part of the national labour force (Riesco-Sanz, 2016). In that evolving framework, collective agreements could be one of the tools for the universalization of labour and social rights also to atypical jobs.

Involving historical trade unions in the process of universalization of labour and social rights is crucial for two main reasons. Sectorial and national trade unions have a strong bargaining power to reach collective agreements, supported by their respective affiliations, and they have a public role in the guarantee, maintenance and reproduction of the workforce (Rolle, 2003). In fact, trade union confederations take active part in public policies, managing working and life conditions of the whole salaried class in different ways: directly, by means of collective agreements and as stakeholders of public powers in tripartite social dialogue, and indirectly, as transmission belt to left parties.

7. Concluding remarks

The analysis of Uber case shows how algorithms and rating systems are increasingly becoming central tools to manage labour relations.

Our standpoint is that managing technological inputs and values is the first point to negotiate algorithm parameters. In this regard, the negotiation of algorithms is also a goal recently underscored by trade union confederations, such as the Italian CGIL, which highlights the need to have knowledge of and negotiate the basic principles of the software employed in order to bring a contractual regulation of algorithm forms and guarantee to trade unions the control of work in the value

chain. [26] It also requires discussing how trade unions are coping with the need to master such skills and how they should develop such expertise (considering that different platforms may require different solutions). Indeed, despite the fact that in this paper we refer to the case-study, this method has not necessarily to be limited to Uber, as algorithms, ratings and technological tools are used to manage workers by an increasing number of companies (Rodríguez-Piñero Royo, 2006).

Thereby, in our opinion, an analysis based on a multidisciplinary approach, with the interaction of technical and legal studies, can be effective on a double level.

On a technical level, transport engineering and statistical data analysis can be used to study the application of technologies on labour relations and to propose alternative solutions on parameters and values. From that starting point, on legal level, different solutions can be negotiated between the company and workers' representatives. The agreement can fix, for example, fairer threshold values (acceptance and cancellation rates) to measure workers' performance, remove clearly discriminatory rates, manage surge pricing and earning rates.

The proposal to include technological parameters in a collective agreement pursues two main goals. The first one is to intervene as a party in the implementation and management of technologies and, by that, to reduce the employer's powers of direction and control. The second one is to further strengthen the role and power of collective actors in the companies of the so-called gig-economy, in order to organise collective actions and negotiate better wages and working conditions.

Nevertheless, negotiating coding in a hypothetical collective bargaining requires collective actors with the bargaining powers to define it, with the challenges and difficulties described in the previous paragraph.

However, in this framework the role of trade unions is still decisive at least in three fields: in representing gig-workers, especially considering the drastic imbalance of bargaining power in the "gig-economy" (Johnston and Land-Kazlauskas, 2018); in impelling the internationalisation of trade union movement, conflicts and strategies against capitals (Baylos Grau, 2008); and lastly, in promoting litigation in the form of class actions against big companies. From that point of view, trade unions should re-thin their representative mechanisms (Dirringer, 2017), in order to open union representation to all workers, independently of the type of contract, under the common framework of salaried class.

[26] CGIL, "Progetto lavoro 4.0. Primo report di attività. Italia 2030. Per un'innovazione socialmente sostenibile", Conferenza di Programma, Milan 30-31 January 2018, especially interesting at point 8 (p. 26) on the negotiation of algorithm. The document is available at http://www.cgil.it/cose-progetto-lavoro-4-0/

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