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INDUSTRY 4.0
NEW CHALLENGES FOR THE
EUROPEAN WORLD OF WORK

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INTRODUCTION

We appear to be on the cusp of a new age. The era of digitalisation looks set to revolutionise the status quo, from the world of work to the way we live, from leisure activities and public space through to politics and privacy. Technically, the term 'digitalisation' refers to the enhancement of information and communication processes by means of digital storage, transmission and processing technology. Innovative hardware and software allows these processes to take place faster and more flexibly and be less location-dependent.

According to some, we are on the verge of a "fourth industrial revolution" (Schwab 2016). What is surprising is the way that this movement is often seen as some unstoppable natural process that humans are powerless to influence. The debate surrounding digitalisation thus resembles the discourse on globalisation in the 1990s. And yet, digitalisation and Industry 4.0 have not come out of the blue. It is profit that drives capitalist society to invest in technological innovation. This is particularly evident if we consider the changes taking place in the world of work. Standard forms of employment are increasingly giving way to a blurring of boundaries between work and leisure time and an ability for workers to be available at all times thanks to smartphones, cloud working and mobile work.

The study 'Industry 4.0 and its Consequences for Work and Labour' (Gaddi/Garbellini/Garibaldi 2018) deals precisely with this relationship between digitalisation and working conditions in the industrial sector, drawing on a sample of 40 Italian companies. Its authors Matteo Gaddi, Nadia Garbellini and Francesco Garibaldi, from Italian left-wing organisations Associazione Culturale Punto Rosso and Fondazione Claudio Sabattini, ask how Industry 4.0 is changing industrial relations. Does it offer greater opportunities for participation and more flexibility for workers, or is Industry 4.0 merely an attempt to monitor performance more closely and intensify work?

The following publication summarises the main findings of the study. It starts by examining current trends in European industrial policy and goes on to define a number of key concepts. There follows a brief discussion of the state of digitalisation in Italy and a description of the study's methodology. The next section presents the findings and looks at the impact that digitalisation is having on working conditions, before considering the implications for trade union action and progressive actors. The conclusion calls for a digital left in step with the times.



KEY FEATURES OF EUROPEAN INDUSTRIAL POLICY

A look at current European industrial policy (see Pianta/Lucchese/Nascia 2016) shows that it is characterised by fragmentation, with production stages spread across different regions, as well as by international value and supply chains. Following the collapse in industrial production in the wake of the 2007 financial crisis, differing dynamics developed in different EU countries. While the 'strong' economies of the West – in particular Germany – are returning to growth, the 'weak' economies of Southern and Eastern Europe continue to suffer economic losses and a reduction in output.

At the same time, these nations are closely linked by a European division of labour, with different countries specialising in different stages of production. This is well illustrated by the automotive sector. A car consists of around 15,000 components that are manufactured throughout the EU. Core competencies and corporate headquarters are usually found in Western Europe, with suppliers based in Eastern Europe. Workers in eastern EU countries are thus often under the control of western corporations. The latter therefore plan the quantities to be produced in a given period, decide on the pace and speed of deliveries, and so on.

The development of Europe's industrial structure is thus based on a process of centralisation (of ownership and planning) but without concentration of production: production remains unevenly distributed geographically, bringing with it the risk of progressive fragmentation and consequent inequality and one-sided dependency.

In Italy in particular, there is a lively debate about possible forms of networking due to the fragmentation of national industrial production. While Italy is characterised by strong industrial centres, production in the country has become increasingly decentralised since the 1960s. One of the key elements in this restructuring process has been the outsourcing of various production stages to subcontractors or to other countries in order to lower production costs and increase flexibility in meeting demand shifts.



KEY CONCEPTS



INDUSTRY 4.0

Industry 4.0 refers to a vision of greater networking and automation in industry through the use of smart machines and robots. It is expected to deliver productivity growth through efficiency gains such as just-in-time production and reduced downtime. This should lead to a reduction in unit costs, offsetting higher labour costs compared with emerging economies.

The term 'Industry 4.0' was first introduced in Germany, where a corporatist coalition of politicians, businesses and trade unions has formed under this banner to drive the political, economic and technological implementation of the aforementioned goals. The German Federal Ministry for Economic Affairs and Energy (BMWi) describes it as follows: "Industry 4.0 combines production methods with state-of-the-art information and communication technology. This smart approach makes it possible to deliver tailored products to meet individual customer requirements – at low cost and in high quality" (BMWi 2018).



INTERNET OF THINGS (IOT)

Closely linked to Industry 4.0 is the Internet of Things (IoT). Both relate to the same fundamental changes and describe the increase in networking and automation of production, but they differ in their focus. While Industry 4.0 primarily describes the social aspect, IoT relates to the use of digitalised and networked products and devices – in everyday life as well as production. The aim of IoT is to connect factories along the entire production chain. The technology, service and finance company General Electric, for example, says that changes in networking due to the Internet and industrial production must go hand in hand (see Gaddi/Garbellini/Garibaldo 2018, 19). Computers should assist people without distracting them or demanding too much attention.



SMART FACTORY

The aim of the smart factory is to maximise profits by continuously improving machinery and equipment through automation and self-optimisation. The structure of a smart factory can include a combination of production, information and communication technologies, and can encompass the entire manufacturing process. The BMWi again: “Smart machines independently coordinate manufacturing processes, service robots cooperate intelligently with people during assembly, while (driverless) transport vehicles perform logistics tasks autonomously. Industry 4.0 thus defines the entire life cycle of a product: from concept to development, manufacturing, use and maintenance – and on to recycling” (BMW 2018a).



**STATE OF
DIGITALISATION IN
ITALY AND RESEARCH
METHOD**



Italy is lagging behind when it comes to digitalisation. The European Commission's Digital Economy and Society Index ranks Italy 25th out of the 28 EU Member States (DESI 2018). Just 6.5% of small and medium-sized businesses sell online – which, in itself, is only the most basic form of digitalisation. Although Italy is the second most industrialised country in the EU after Germany, small and medium-sized enterprises dominate the Italian economy. These have little capital to invest, which in turn inhibits digital development.

Thanks to Industry 4.0, Germany has been able to gain competitive advantages by implementing suitable measures. In the case of Italy, the final outcome is not yet clear.¹ However, digitalisation has become a hot topic of discussion for Italian industry, given its need to become (more) competitive in this area. In autumn 2016, the government unveiled its national plan 'Industria 4.0' (MiSE 2018) to promote digitalisation in the country. It is focusing its investment on education and training, upskilling and regional programmes, backed by funding of €13 billion. This, together with massive tax breaks, aims to leverage just under €25 billion of private investment.

However, the government plan fails to consider the perspective of work and labour. How will companies and regions implement the new focus on Industry 4.0? What new skills will workers need? How will work tasks and processes change? These questions are not even mentioned in the government plan, which focuses solely on serving capital interests.

In view of the above, it is worth taking an empirically informed look at how Industry 4.0 will change workers' status and working conditions. To answer this question, the researchers behind 'Industry 4.0 and its Consequences for Work and Labour' studied 40 Italian companies in a range of sectors. They surveyed companies in the automotive and steelmaking industries as well as firms that manufacture industrial equipment and electronic goods, including multinational corporations such as General Electric and smaller and medium-sized Italian enterprises.

1 Gaddi, Garbellini and Garibaldo emphasise that ultimately it is people who remain the key factor in the digitalisation process. What is often overlooked in these discussions is that technology alone 'is not a thing'. It is not a thing but a social relationship. What matters is not the fact that technology has been given material form as a computer or 3D printer but rather the production conditions under which these were developed.



The study was carried out by researchers at the Milan-based Associazione Culturale Punto Rosso and Fondazione Claudio Sabattini in Bologna. Both organisations carry out research “for the cause of workers” (Fondazione Claudio Sabattini 2018). In addition to the three authors, half a dozen researchers from various Italian universities and the research institute of the Italian trade union confederation CGIL (Confederazione Generale Italiana del Lavoro) were also involved.

The team began by gathering general information about each company (product, market position, work organisation, technologies used, investments, relationships with suppliers and customers), and then conducted interviews with workers and in some cases managers at these companies.

The research team’s questionnaire addressed the following issues:

- > Impacts of Industry 4.0 on the profession
- > Change in skills and competencies
- > Production cadences, working times and saturation
- > Short description of lean production or other production models
- > Scope and modalities of employee performance monitoring
- > Scope and modalities of technology-driven work activities
- > Networks such as main suppliers, other Group companies, customers
- > Industrial relations²

2 The questions were then adapted to the respective work processes in each company.



This generated a mass of material reflecting the actual conditions on the ground in each company. The aim of Gaddi, Garbellini and Garibaldo is, in part, to put the scientific data they collected to political use. Accordingly, a consistent focus in the study is on the interactions between technology, social development and political and economic framing.

The results are intended to provide Italian trade unions (such as the metalworking federation Federazione Impiegati Operai Metallurgici (FIOM) and the trade union confederation CGIL), as well as progressive European actors, with tools to better understand the implications of Industry 4.0 and thus to influence current and future upheavals in production and labour.

A dark, industrial setting featuring a robotic arm with a corrugated metal hose. The background shows a person standing near a metal frame structure. The overall atmosphere is dimly lit, emphasizing the metallic textures and industrial environment.

STUDY RESULTS: IMPACTS OF INDUSTRY 4.0

This section sets out the main findings of the study in terms of the impacts of the introduction of Industry 4.0 in various areas.

IMPACT ON EMPLOYMENT RATES

The question of the relationship between digitalisation and employment is usually answered in a rather simplistic way. Digitalisation is either seen as a cause of mass unemployment by making many jobs superfluous (Frey/Osborne 2013; Bruegel Institute 2016; Löhr 2018) or, conversely, as an opportunity to create new jobs (Weber 2016).

So far, however, the introduction of Industry 4.0 technologies in the companies surveyed does not seem to have had any *significant* impact on the employment rate, just as concerns about ‘factories without people’ in the 1980s and ‘paperless offices’ in the 1990s failed to materialise.³ Undoubtedly, however, jobs will disappear, as the study shows with regard to Italy. Low-skilled and medium-skilled jobs are at particular risk. Routine tasks (both in manufacturing and in administrative services), which are well structured and governed by clear rules, are more susceptible to being automated and thus more likely to disappear.

However, while many of the companies participating in the study have achieved a relatively high level of automation, Gaddi, Garbellini and Garibaldo do not share the view that human labour will be replaced by automation. Even the trade union representatives interviewed believe that some new technologies will undoubtedly lead to progress and improvements in production. The trade unions cannot therefore be accused of a Luddite hostility to technology.

3 By focusing on individual companies, the authors can illustrate the specific strategies adopted by these firms with respect to Industry 4.0. A common strategy among the surveyed companies seems to be to increase output and productivity without hiring new staff. The financial crisis led to massive job losses and a resulting decline in output. The hope now is that Industry 4.0 will enable output to return to near pre-crisis levels without corresponding increases in employment.



IMPACT ON VERTICAL AND HORIZONTAL INTEGRATION

As a result of Industry 4.0, production will become more closely integrated within or between companies or their divisions, as cross-company networks evolve to enable automated and coordinated value chains. The range of possible applications is huge, including joint management of machines, programmes and tools, or the ability to monitor a product's processing status or a machine's need for maintenance from anywhere in the world. In this context, a distinction must be drawn between vertical and horizontal integration.

VERTICAL INTEGRATION

Vertical integration relates to same-level communication, i.e. within the same plant or between plants belonging to the same company. With the advent of digitalisation, the companies surveyed are increasingly using software for machine-to-machine connections, enabling all information about production processes to be collected and managed. Thanks to communication between different areas and the fact that all production lines are connected, the software can now plan and monitor the proper implementation of tasks. Any change in the production parameters of one machine is immediately communicated to all other machines and lines, but also to all other plants in Italy and abroad. Vertical integration can thus control current production and ongoing processes at any time and immediately detect any problems.

The study found that devices such as scanners, touchscreen PCs, on-board computers and tablets can be used to track what workers are doing at all times. All these tools record data about operations, times and components to be used. In other words, they allow the whole production process to be coordinated – but also monitored.

HORIZONTAL INTEGRATION

The second type of integration enhanced by Industry 4.0 is horizontal integration. This refers to the connection between plants of a company that are active in different areas (sometimes in different countries) and between the company and its suppliers.

In addition to networking between different production sites, horizontal integration also enables customers to become more involved in the process. In some cases, they can decide exactly what is produced and how. Communication with customers thus goes far beyond normal customer service. From the design phase through to production, customers can provide their input into the product, thanks to a constantly updated exchange of information throughout the process. This requires smart system communication covering demand, production and logistics. A range of areas can be networked, such as machines, storage systems and equipment. Horizontal integration enables the production chain to be integrated in a fully cohesive way.

Vertical and horizontal networking is a core strategy for the companies studied. They expect it to deliver integrated exchange of information and thus efficient cooperation between all parties involved in a value creation network.



IMPACT ON WORKING TIME

Another key change brought about by Industry 4.0 relates to working time. According to the study findings, the resulting changes in working hours and schedules are generally adverse to workers. The interviewed workers talked about an intensification of the pace of work and of working time. This change is due not only to the introduction of new technologies but also to capital market-oriented business rationalisation and restructuring measures. Working hours are extremely difficult for workers to plan due to major fluctuations in production peaks and troughs. Working times are being monitored more and more closely whilst also changing spontaneously and unpredictably. This requirement to be available, or potentially available, at all times generates stress and insecurity among workers.

The company survey found that working times themselves and their forms are not negotiated but imposed unilaterally by the companies. Although the practicalities of work schedules vary widely in the different companies studied, they are similar in their focus on increasing productivity. The aim is for not just individual production steps but the entire production process to become more efficient, in other words faster and cheaper.



IMPACT ON WORKER PERFORMANCE MONITORING

Work content and processes are set to change. In the companies surveyed, the workers interviewed report that their workload is becoming heavier. They also refer to increased and continuous (digital) surveillance. Logistics industry workers in particular talk about the possibilities of real-time tracking and monitoring. The intensification of workload is reinforced by technologies that make it possible to track the start and end of each individual work step, such as worker-specific bar codes that are logged when machines are operated. The most flagrant example of permanent workplace monitoring is Amazon. In his book 'Hired: Six Months Undercover in Low-Wage Britain' (Bloodworth 2018), British journalist James Bloodworth reports how employees would urinate in bottles rather than take a toilet break, for fear of being punished. During a ten-hour shift, they only had a 15-minute lunch break. Similarly, the survey of Italian companies found that surveillance was creating continuous rivalry between employees, placing them under a lot of pressure.

These new monitoring opportunities and practices in companies include moments of "indirect control" (Huchler/Voß/Weihrich 2007). What this means, first and foremost, is that it is no longer the work done but only its outcome that is taken into account. *How* the work is done hardly matters any more; all that counts is *what* results from it. Companies care about specific targets but responsibility for how these are achieved and the resources expended on them falls to employees. Secondly, monitoring of work and performance is being depersonalised so that it is no longer managers who track results and demand faster performance but seemingly objective indicators. This makes protest or discussion much more difficult.

As the study shows, these two aspects are intertwined at the surveyed companies: all work steps and processes can be monitored almost in real time (and if need be, also globally). Huge volumes of data are not only recorded but can also be immediately exploited. Self-learning machines, or artificial intelligence systems, constantly compare actual and target values.



However, it is not clear to employees how these (supposedly neutral) computers reach their conclusions. The impartiality of control logic systems based on indicators is an illusion. Even the algorithms are not neutral, but were developed by humans based on set criteria that prioritise boosting productivity and efficiency over good working conditions. Currently, therefore, digitalisation is tending to work against employees, and the potential that it offers for improvements to work design and day-to-day working life is being overlooked in favour of opportunities to exercise (indirect) control over workers.

IMPACT ON THE HUMAN-MACHINE RELATIONSHIP

The relationship that will exist between people and their robotic 'colleagues' in Industry 4.0 remains uncertain. However, what does seem clear is that there will be more and more direct interaction between people and machines, not only humanoid robots but also machines taking control of work processes and relegating humans to a participatory role.

The researchers found that, despite all the rhetoric about Industry 4.0 technologies creating more freedom and flexibility, workers themselves feel increasingly excluded by the growing importance of machines. The idea that new technologies promote participation and freedom does not appear to be borne out. The use of machines is usually designed not to take pressure off people but to improve company processes and make them more productive.

According to the study, the centrality of computer-based planning in companies means that information is increasingly being transmitted via machines rather than people. Furthermore, artificial intelligence makes it possible not only to collect and evaluate this information but also to use it productively and to alter it. For example, the algorithms used by control computers are not written or uploaded by the workers who will be operating the machines. In some cases, the programming and thus the parameter setting is done by external departments that program and control the machines remotely over intranet or Internet networks. Workers are not informed about the parameters and other criteria on which the algorithm is based, and they do not know how the machines they operate actually work.

The study also found that the use of intelligent tools and machines in smart factories does not mean that workers have higher skill levels. On the contrary: in some companies, the tasks were more monotonous and less well paid.⁴ There is therefore a growing need to address the changes taking place in the relationship between humans and technology. Accordingly, the question of how to organise the division of labour between digital/machine-controlled processes and human labour and what say workers should have over this organisation becomes key.

4 However, this process is anything but new. Karl Marx in *Das Kapital* describes how "raising the social productiveness of labour is brought about at the cost of the individual labourer" (MEW 23, 673). In this way, "all means for the development of production transform themselves into means of domination over, and exploitation of, the producers; they mutilate the labourer into a fragment of a man, degrade him to the level of an appendage of a machine" and "estrangle from him the intellectual potentialities of the labour process" (ibid.).

INTERIM CONCLUSION: IMPACTS OF INDUSTRY 4.0 ON THE WORLD OF WORK

The aforementioned impacts of digitalisation on the Italian industrial sector can be summed up as follows: in none of the companies surveyed were digitalisation processes carried out independently of changes in other areas of the company. The resulting reorganisation has affected both the actual production and manufacturing process as well as aspects of management and technical planning. Almost all areas of the companies surveyed have been affected by digitalisation.

From the company's perspective, the focus is on boosting efficiency. For example, in an internal document, engineers at Fiat stated that workers must be subservient to the needs of an automated and controlled system (see Gaddi/Garbellini/Garibaldi 2018, 14). In workplaces, this means a restructuring of work processes to increase value-added production. To achieve this, the surveyed companies rely primarily on innovations in management and production, such as lean production, which is the systematised organisation of production to deliver substantial savings in labour, costs and material (through automation, for example). The fragmentation of production processes leads to a deep fragmentation of work, in which workers increasingly compete with one another, which in turn exacerbates the power imbalance between capital and labour.



The study focuses on the relationships between technology and social dynamics, since technologies never operate in isolation but are embedded in social relations. Similarly, they are not neutral but are designed in such a way that they are open to certain options and closed to others: thus, the assembly line came about as a result of efforts to make multiple small work steps as efficient as possible. This will always remain the case. By contrast, algorithms can be reprogrammed to enable them to be used in an emancipatory way.⁵ In other words, technologies are the result of human decisions and are thus always the expression of interests and hierarchies. Consequently, technological progress does not automatically entail social progress. Sometimes, it can result in the opposite. Under capitalist conditions, technology does not automatically entail emancipatory developments such as a reduction in working time, but it may lead to (mass) unemployment.

However, this process can be shaped. The study indicates that the relationship between technological innovations and social conditions in companies is largely determined by the strength of trade unions. Aside from the level of organisation and the bargaining power that this confers, the key factor is the willingness of trade unions to take responsibility for resolving workers' problems. This means taking workers' concerns seriously. Likewise, the study describes the role of company and trade union representatives in involving workers in innovation decisions in the workplace – not only as passive recipients of change but also as an organised workforce helping to shape the processes.

5 In the study, this is summarised as follows: "So, summing up, a 'good' algorithm should be open and transparent with its selection of criteria and goals; should be open to correction through feedback assessed in an open and public discussion, it should be fair to the interests of the people affected and it should do no harm to them. Its domain of application should be exactly and openly delimited" (Gaddi/Garbellini/Garibaldo 2018, 14).



A photograph of a factory interior, likely a clothing manufacturing plant. The scene is dimly lit, with rows of fluorescent lights hanging from the ceiling. In the foreground, there are metal racks filled with dark-colored garments, possibly jackets or coats. The floor is made of dark, textured tiles. On the left side, there is a blue metal structure, possibly a gate or a partition. The overall atmosphere is industrial and somewhat somber.

**TRADE UNION
STRATEGIES ON
INDUSTRY 4.0**

All this presents the unions with new challenges. Traditional approaches are no longer adequate, so trade unions must expand their repertoire to incorporate new areas of action:

SKILLS

Digitalisation will reinforce an existing trend that is making some industrial activities harder and harder to plan. This will mean huge changes to the skills and qualifications required by workers, and unions will therefore need to make future-oriented education and training one of their central demands. If, as the surveyed companies suggest, the workforce becomes increasingly polarised, this raises an issue of social inequality: for what happens to all those workers who cannot keep up with the latest developments? Only a small proportion of the jobs created by digitalisation will be well paid. There will be small numbers of programmers and IT engineers, but the overwhelming majority will be supply chain, warehouse and casual workers, mostly on very low rates of pay. One of the main priorities of unions and progressive actors must therefore be to combat this form of social inequality. To this end, a minimum demand must be to expand and improve education and training opportunities, especially for low- and medium-skilled workers. Works councils are thus urged to work with company colleagues to demand concrete action in this area.

WORKPLACES AND FORMS OF WORK

Karl Marx wrote that the worker “is at home when he is not working, and when he is working he is not at home” (MEW 40, 514). However, this is now less and less the case, especially in the service sector, with people able to work any time and anywhere: on a train, in a café or in the ‘home office’. Mobile devices enable comprehensive networking, extending to the control of production. As a result, the boundaries between work and leisure time are becoming increasingly blurred, and the ability to self-exploit by working at night or being permanently available is growing fast. Greater flexibility in what constitutes a workplace is also creating entirely new forms of work. Platform-mediated work, such as on-demand services or crowdworking, is having a negative impact on work quality and leading to exploitation. This goes hand in hand with a “dissolution of work boundaries” (Gottschall/Voß 2005) and a general intensification and acceleration of work



processes. All of this poses a major challenge to trade unions, especially given the desire of many workers for flexibility and the reluctance to return to the rigid framework of traditional employment relationships. In this context, a raft of new challenges are emerging as regards decent work, health and safety, and so on. Company agreements on trust-based working times and places could be a viable option in this regard.

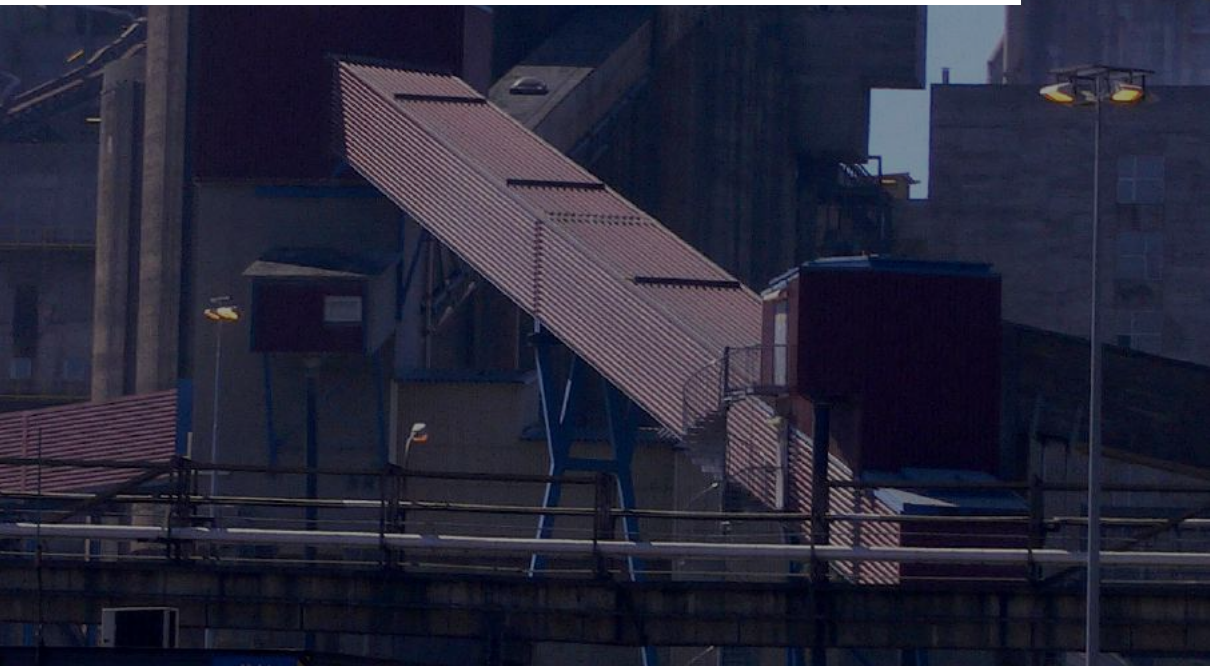
WORKING TIME

Working time policy has always been a central issue for trade unions. Currently, for workers this means having a greater say over their own time, in particular the ability to set limits on their availability but also to request shorter or longer working hours depending on their circumstances.

Completely new models are needed for working time and how this can be better distributed. Frigga Haug (2008) proposes an up-to-date solution in the form of the 'four-in-one perspective'. This entails giving equal priority to four areas of activity – paid employment, reproduction, culture and politics – thereby valorising previously unpaid forms of work, giving people more of a say over their own time and reducing working hours. Employees would be allowed more freedom, and greater consideration would be given to the gender dimensions of work. The demand for collective reductions in working hours must consider individual needs for "time prosperity" (Rosa et al. 2014) and the right to one's own time. "If trade unions present time policy as a holistic project, the impact could be hegemonic and powerful: traditional problems of industrial society and of service occupations could be brought together and linked under the umbrella of trade union time policy" (Wimmer 2016, 6). This could be the start of a high-impact project, ultimately pointing to something beyond capitalism.



CONCLUSION



The aim of the Gaddi, Garbellini and Garibaldo study was to show how Industry 4.0 is influencing working conditions, in order to make it easier, for trade unions in particular, to shape the world of work.

COMPANY OBJECTIVES

The study found that companies are using technical innovations in diverse and systematic ways to increase productivity. The fundamental principle of the capitalist economy is that of competition, which forces companies – “on pain of extinction”, as Marx repeatedly puts it (MEW 25: 255) – to be better than other companies by means of new business models, more efficient operations and a constant succession of new products. This often has implications in terms of labour and personnel policy. In principle, therefore, the constant pressure to innovate is nothing new for companies. However, the digitalisation process threatens to intensify this pressure, at the expense of workers. The study has shown that, under current conditions, Industry 4.0 and digitalisation are not creating greater flexibility for workers and the increased use of machinery and technology is not leading to improvements in the working conditions of wage earners.

INCREASING POLARISATION

As a result of this, according to the authors, digitalisation will produce a polarisation of the Italian labour force between highly-skilled (and paid) and low-skilled jobs. This split might result not only in polarity within companies or between sectors but also in a further geographic polarisation, which could deepen centre-periphery asymmetries in Europe. At the same time, this process is making European industry more tightly networked, with the result that companies at the top of the value chain can decide on production planning, the pace of production and work organisation, thus making suppliers more dependent. As a result, the boundaries between different companies are blurring, meaning that new corporate governance models may emerge.

PRACTICAL IMPLICATIONS FOR TRADE UNION ACTION

These developments raise the question of how such changes will affect workers. Further industrial networking in Europe will make it crucial for trade unions to develop an international perspective. As value chains become increasingly globalised and networked, strong unions will be needed that strive to improve working conditions throughout the process.

Digitalisation requires unions to protect wage earners from the disruptive consequences of the process, reduce work-related stress and strain and substitute monotonous work while at the same time allowing workers to exploit new freedoms and maintaining and increasing their ability to influence and participate in the companies where they work. Specifically, this means expanding workers' self-determination in their day-to-day work and their wider working lives. This includes choosing their own working hours, in line with company processes, an effective right to return from part-time to full-time work, as well as the right to decide for themselves whether or not to work from home. This must be accompanied by legal rights to sabbaticals and time off for family or caring responsibilities as well as a right to switch off work-related devices (mobile phones, computers, etc.) outside of working hours. Industry 4.0 also requires a fresh discussion of the issue of worker participation. On the one hand, this is about employees being able to have a say in which technologies are used and when. On the other hand, there are also opportunities to re-examine issues of economic democracy (see Bergmann/Daub/Özdemir 2018): the development of productive forces (as expressed in the digital domain) opens up new scope to democratise decision-making within the economy.

FIGHTING FOR THE WHOLE PERSON

Employment relationships and working times are changing, monitoring is on the rise and production is increasingly controlled by smart machines. However, digitalisation is not confined to the world of work: many other areas of society have the potential to be restructured by new digital technologies.

If the capital side seeks to 'economise' all spheres of life by means of lean production and indirect control, progressive actors and trade unions will need to start considering people in the wider context of their lives, rather than just focusing on wages. Progressive trade unionists already understand this and, as well as demanding better pay, have always considered the cost of reproduction of labour

power and so pursued pension and health policies as well as fighting over working time and forms of work. The thrust of this 'whole life' approach is that wage earners are also parents, tenants, customers and so on. All of this has to be thought about holistically. Trade unions must therefore develop a new and inclusive type of class politics and should increasingly see themselves as (among other things) a social movement. This means forging alliances, especially with civil society actors and key scientists/academics, and expanding their own organising capacity.

Criticism of the capitalist form of digitalisation is broadening and trade union initiatives are gaining ground. This could possibly form the basis for developing an organised narrative as to how digitalisation can be shaped in an emancipatory way, in the interests of workers.

BUSINESS AS USUAL?

Despite all these changes, the study argues against the rhetoric that digitalisation is a radically new and full-fledged social transformation (see Butollo/Ehrlich/Engel 2017, 34). A technology does not, by itself, constitute a new mode of production. Even in a capitalism undergoing digitalisation, technology will not be the only determining factor, and it is important not to lose sight of the interplay between economic and social conditions. It is not Industry 4.0 and digitalisation that determine the development of the capitalist mode of production, but rather the other way around.

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