Robotisation shortens the training period of cutting bicycle helmet venting holes from six months to only three days. PC: Huang Yu.

Robot Threat or Robot Dividend?

A Struggle between Two Lines

HUANG Yu

With China being the world's largest market for industrial robots, robotisation has become a hot topic in the Chinese public discourse. While media reactions have been polarised between those who fear large-scale displacement and those who emphasise the rise of newly created jobs, there has been little solid research looking into the impact of robotisation on labour market and shop floor dynamics. In this essay, Huang Yu assesses both the 'robot threat' and the 'robot dividend' discourses, offering some views on how workers should react to the ongoing technological revolution.

Since 2013, China has become the world's largest market for industrial robots, recording record sales of 87,000 units in 2017. With the publication of the 'Made in China 2025' plan in 2015, robotisation has become a hot topic in public discourse. While media reactions have been polarised between those who fear large-scale displacement and those who emphasise the rise of newly created jobs, there has been little solid research looking into the impact of robotisation on both the labour market and shop floor dynamics. Based on fieldwork conducted in the Pearl River Delta (PRD) since late 2015, in this essay I try to assess both the 'robot threat' and the 'robot dividend' discourses, offering some views on how workers should react to the ongoing technological revolution.

From 'Workerless Factory' to 'Robots Create Jobs!'

China's robotic revolution took off against the backdrop of periodic labour shortages much bemoaned by companies. Soon after the publication of the 'Made in China 2025' plan, official media enthusiastically applauded the ability of robots to reduce the labour force. Two news stories were widely circulated at that time. The first regarded the debut of a 'workerless factory' (*wuren gongchang*) in Dongguan in 2015, a mobile phone module manufacturer which claimed that an industrial robot could replace up to eight workers while reducing the product defect rate by over 20 percent (Xinhua 2015). Significantly, the firm was awarded a subsidy by the Dongguan government under the policy of 'replacing humans with machines' (*jiqi huanren*), underlining how a coalition between government and industry planned to overcome the labour shortage problem.

The second focussed on how the Foxconn factory in Kunshan, Jiangsu province, retrenched 60,000 workers, over half of the total work force in 2016 (Zuo 2016). The public could still remember how, a few years earlier, just after the notorious spat of worker suicides (Pun and Chan 2012), Terry Gou—the CEO and founder of the company—had haphazardly announced the plan to use one million robots to replace its human labour force. He unabashedly praised the advantage of robots over humans, stating that 'human beings are also animals, to manage one million animals gives me a headache' (Kwong 2012).

Although most media reporting embraced the discourse of the 'workerless factory', a minority of reporters criticised the motivation behind the robotisation initiative of local governments. For instance, writing for *Beijing Youth Daily*, Lijian Xing stated:

> After robots were introduced to replace humans, local governments did not need to take up the responsibility of offering job retraining to the displaced workers. When tens of thousands, hundreds of thousands, and ever more migrant workers sullenly left, local governments could enjoy a significant cut in their budgets for security, education, healthcare, housing, and other public facility provision (Xing 2016).

As media coverage began to highlight the risks of large-scale unemployment as a potential social threat over the last couple years (Guo 2016; Zhou and Jiang 2016), the public discourse has begun to shift from robots replacing workers to robots creating jobs. Media reports have either been tracing historical cases to downplay the threat of new technologies, or have cited research to demonstrate how Artificial Intelligence (AI) and/or robotics can generate more jobs than they eliminate. For instance, several reports have backed the notion of the 'Luddite fallacy' (*lude miulun*) by arguing that new technology does not lead to higher overall unemployment. One journalist contended that when horse-drawn carriages were phased out by automobiles, film cameras by digital cameras, or pagers by mobile phones, more jobs were created than culled (Wuhua 2017).

More recently, a report issued by the International Federation of Robots has been widely cited, as it determined a job-creation ratio of 3.6 jobs for every robot deployed (Tian and Cai 2018; Zheng 2017). After the State Council rolled out the 'Next Generation AI Development Plan' in July 2017, media further focussed on the positives. One report claimed that in England AI had eliminated 800,000 'low-end jobs', but had simultaneously created 3.5 million new positions (Jin 2017). Another suggested that the trend of job shrinkage caused by robots would end in 2019, as after 2020 AI would become a positive force generating 2 million new jobs (net) by 2025 in the United States alone (Xia 2018).

The Robot Contradiction

In the Chinese media, AI and robotisation are largely portrayed not only as an inevitable trend but also as a boon for society. However, the damaging effects of robots on the labour market should not be overlooked. A recent study reviewing employment in the United States from 1997 to 2007 found that each new robot added to the workforce meant the loss of between 3 and 5.6 jobs in the local commuting area, not to mention a decline of between 0.25 percent to 0.5 percent in local wages (Acemoglu and Restrepo 2017). Since China's robotic industrialisation has just begun its dramatic expansion, there has not been much aggregate research on the potential impacts of robotisation on workers. However, my research has found that, among the four firms that possessed comparative employment data before and after automation, the workforce reduction rate in the production line ranged between an alarming 67 and 85 percent (Huang and Sharif 2017). Moreover, although media and firm representatives have tried to downplay automation's impact on the workforce, with talks of a 'labour shortage' already under way, it is important to note that by early 2017 Dongguan's subsidy plan had already culled 190,000 workers, a figure that far outnumbers the estimated labour shortage of 100,000 reported in 2015 (Huang and Fu 2017).

Still, so far we have not witnessed the kind of widespread use of robots that throws workers onto the streets in great numbers. Although robot demand has continued to soar in the last five years in China, in 2016 a total of 87,000 robots were sold in the country while robot density remained at only 68 units per 10,000 employees (IFR 2017 and 2018), a minor number in comparison with China's 282 million migrant workers in that year. This is largely because technological upgrading itself is not a linear and smooth process, but is subject to gaps and disruptions. For instance, despite the initial hype over robotisation in its Kunshan plant, Foxconn failed to put its 'Foxbots' into widespread application on the assembly line due to frequent problems and breakdowns (Jianxiaojiao 2017). Part of the reason is that since their invention, industrial robots have mostly targeted the automobile industry for heavy-duty tasks such as welding and painting, but robots that excel in light-duty, flexible, and versatile tasks are relatively recent additions. The first collaborative robots that are designed for versatile tasks and can work around humans debuted in 2014, and their demand is expected to increase roughly tenfold by 2020 (Trobe 2016).

Therefore, we will likely see a shrinking labour market in the manufacturing sector in the coming decades, and many migrant workers in China will either have to shift to the service industry or return to the countryside. In fact, employment in the service industry has already exceeded manufacturing since 2011. However, labour conditions in the service sector have been identified as even more precarious and deregulated than in manufacturing, with opaque labour relations, low contractualisation rates, and inconsistent payment of overtime in several sub-sectors (Worker Empowerment 2017). Moreover, robots have also found their way into the service industry and might have a significant impact on labour even there (Youshino 2017). What about going back to farming? The prospect that agriculture can sustain a living is not very promising. The Ministry of Agriculture recently announced that 35.1 percent of the country's farmland has been transferred from small farmers to rural elites or agribusinesses (Ministry of Agriculture 2018). If workers are displaced by robots but have no land to return to, China might soon see the rise of urban ghettos and mounting social problems. However, the national government has not yet conducted a comprehensive study of the impact of automation on workers, nor has it offered any prospective solution to the potential problems (Butollo and Lüthje 2017). Local governments are reluctant to treat migrants as permanent residents and are unwilling to shoulder the negative consequences that industrial upgrading might pose for those workers.

Deskilling or Upskilling?

Unlike the debate on the effect of robots on employment, the media's attention on how automation impacts workers' skills is relatively scant. Although the issue today is largely overlooked, decades ago this used to be a hot topic that captured much scholarly attention. Sociologists who explored the processes of industrial automation in the United States and Japan from the 1960s to the 1980s revealed how the introduction of numerical control machines rendered machinists deskilled by separating concept from execution. As automatic machines forced workers to surrender the control of the labour process to the management, managers quickly replace unionised, skilled machinists with non-union, white-collar employees as a way to curb labour activism (Braverman 1988; Morris-Suzuki 1988; Noble 1979). My research has found that for sectors that used to rely on manual skills, such as woodwork, clothing, and metal processing, the impact of deskilling is very obvious. For example, in a factory that manufactured bicycle helmets, robotisation shortened the training period of cutting venting holes from six months to only three days. Similarly, in a door-making factory, automation rendered carpenters deskilled and replaceable by novice workers. Here, the deskilling effect brought on by automation might have some potential for promoting common interests between veteran and young workers. However, with the government's restriction on collective labour rights, combined with more and more stringent control of worker organisation and activism, the chances of seeing a broader base for labour solidarity seem to be slim.

Still, the lack of a skilled workforce has been identified as a main obstacle to China's drive for 'intelligent manufacturing'. In December 2016, the central government issued the 'Development Planning Guidelines for Manufacturing Talents', in which it projected an alarming gap—3 million in 2020 and 4.5 million in 2025—of skilled personnel for numerical control tools and robotics (Ministry of Industry and Information Technology 2017). The guidelines also suggested that by 2020, apart from the 22 percent college-educated 'talents', the majority (78 percent) should be skilled blue-collar workers able to handle robots and automatic equipment coming from two sources: job retraining or vocational schools.

Given China's past development path that has hinged on labour-intensive and low-skill manual work, a lot of manufacturers were either slow or even reluctant to take up labour retraining. Among the eight manufacturers that I studied in Dongguan, only one invested in training workers, and this was because the company engaged in high precision metalwork that requires substantial levels of skill in the production process. Mr Zhou, the owner who used to work in a state-owned enterprise, had set up an in-house apprenticeship programme to train skilled workers who could handle tasks such as changing fixtures and jigs, adjusting computer numerical control machines to new functions, and who could, eventually, participate in designing the production process (Sharif and Huang 2019). He understood that while technology was important, the true value of the machines could only be harnessed if the technology was combined with the relevant and appropriate human-embedded skills. In his words: 'Machinery is something everybody can buy, but a good production process (*gongyi liucheng*) needs to be designed. One component is hardware and the other is *software*.' As a small and medium enterprise, the case of Mr Zhou's company is quite exceptional. Given the high turnover rate, very few employers in Dongguan are willing to invest in worker training. Recently, a survey has identified that in the Pearl River Delta from 2010 to 2013, the percentage of migrant workers who ascended to management or technician positions dropped from 24.85 percent to only 12.86 percent, while those who remained operators increased from 75.15 percent to 87.14 percent (Xu 2016).

The contradiction between the high demand for robot operators and the manufacturers' low initiative in offering in-house training has

prompted the emergence of market-based job retraining programmes operated by labour recruitment agencies. In 2016, I visited one of these programmes in Dongguan to assess the upskilling potential of robotisation. Is it possible that through training, factory operators who were replaced by robots could ascend to be controllers of advanced equipment? This programme offered two kinds of courses: one primary programme charging 6,000 yuan either for full-time instruction lasting two months or for part-time weekend learning lasting five and a half months; and one advanced programme running for four months for 15,800 yuan. However, most of the students were not low-skilled, assembly line operators, but trained workers equipped with electrician and machine maintenance knowledge who sought to improve their skills. One of the students I interviewed had a senior high school diploma, had worked as an electrician in a metal processing company for four years, had taught himself programmable logic controller (PLC) programming when he worked in elevator maintenance in a home appliance company, and eventually found a position as an engineer in a firm that supplied abrasive blasting equipment. In 2016, he decided to quit his 7,000-yuan-a-month salary job and signed up for the robotics-training programme after observing the large-scale robotisation in some of the client firms of his company. The director of the vocational school assured students that their salary could jump to over 10,000 yuan per month one year after completion of the programme. While some media coverage touted the potential of robotisation for upskilling the labour force, they have generally concealed the fact that only those with certain skills in electrical circuits and PLC programming could advance to become robotic engineers. For the vast majority of assembly-line operators, the chances remain very slim.

Vocational schools might serve as the most viable source to supply skilled workers for a roboticised manufacturing sector. In China, the projected demand for vocational labour in 2020 is expected to reach 79 million despite a supply of only 63 million, leaving a gap of 16 million—a staggering 20 percent shortage (Chen et al. 2013). While both the state and enterprises agree on the need to expand technical and vocational education and training (TVET), the question of who should take up the responsibility remains a hotly debated issue. Recently, China released the 'Modern Vocational Education Development Strategy (2014–20)', a document that outlines a roadmap for TVET. Here, the government has called for companies to be a key provider of TVET and has pushed forward the privatisation of the TVET sector, requiring that 80 percent of the large- and medium-sized enterprises become 'providers of TVET services' by 2020. The government will reward this act of 'corporate social responsibility' with tax relief (Kloer and Stepan 2015; Liu 2014). However, pundits question whether support of vocational training by large corporations through privatisation measures will lead to systematic improvement, especially considering that small and medium enterprises suffer from a severe shortage of talent, and that their size and financial constraints render them unable to enter into cooperation agreements with vocational colleges.

At the same time, the TVET privatisation drive has also attracted the investment of firms not specialised in manufacturing. Recently, I visited a vocational school located in a poor province in western China, a newly established institution that has adopted a policy of 'being run privately with public support' (*minban gongzhu*), a model in which the local government sponsors the salary of teachers, while the owner, a real estate developer, covers the other expenses necessary to maintain the school's operation. In fact, the developer decided to invest in vocational education in order to grab land cheaply to build commercial apartments. When we visited the school, we could see that an upscale residential block was under construction adjacent to the campus. To respond to the state's poverty reduction initiative, this province has sought to become a big data hub and has encouraged local

vocational schools to set up related programmes to meet the labour market demands. In 2017, this school started to offer programmes on big data, intelligent product development, and industrial robot technology. However, as these new concepts and technologies still look unfamiliar to most parents who live in this mountainous region, each programme recruited less than ten students. Now, the students have almost finished the first year of instruction, but the practical training lab is still under construction. Having little confidence in their ability to become proficient programmers after they graduate, many of them are planning to work in sales of these high-tech products.

Learning from the Past

The discursive transition from 'workerless factory' to 'robots create jobs' seeks to downplay the effect of job displacement that industrial automation brings to the most populous country in the world. These two terms both echo the notion of 'robot dividend' that designates machines, rather than human labour, as the source of value, further marginalising the position of workers in society. In light of this, it is unsurprising that the Guangdong government froze the minimum wage for three years from 2015 to 2017. However, since technological upgrading helps many firms reduce costs and increase profits, workers should fight to get a proper share of the 'robot dividend'. At least that was the main agenda that trade unions in the United States adopted, as a way to acclimate the workers to the new modes of production 'when the capitalist drive for a greater intensity of labour oversteps the bounds of physical and mental capacity' (Braverman 1998, 104). Now, for firms in China that have already established collective bargaining—especially those in the profitable automotive sector—increased wages and shorter working hours should be key agendas. For the vast majority of small and medium enterprises, this demand might be harder to achieve. Still, once, after I presented my preliminary findings to some workers at the end of 2015, they started to question why the Dongguan government only offered subsidies to firms but not to displaced workers. Raising workers' awareness of their entitlements might be the first step towards devising suitable strategies.

Workers need to be aware of the long-term impacts that industrial automation might have on labour. Such awareness can be gained by examining previous cases. Back in the 1970s, Harry Braverman unveiled how increased labour productivity and levels of working-class consumption have the potential to leave a negative legacy for the labour movement, as the unionised working-class 'increasingly lost the will and ambition to wrest control of production from capitalist hands and turned ever more to bargaining over labour's share in the production' (1988, 8). Similarly, under a drive to maximise profit, firms in the Soviet Union pursued a strategy of shrinking the labour force and increasing work intensity, resulting in severe unemployment nationwide (Writing Group for 'Socialist Political Economy' 1976). Learning from Soviet lessons, Maoist policy emphasised that workers, rather than machines, should be the main propagator of the technological revolution. In the Mao era, it was believed that industrial upgrading could only be accomplished through 'mass movements', rather than the reign of technical experts. Overall, workers should understand that technological change is never a neutral process but a site of struggle between two lines. As capital further consolidates its position through investment in roboticisation, workers must seize the moment and struggle for their rights and positions. ■

This text is taken from *Dog Days: A Year of Chinese Labour, Civil Society, and Rights, Made in China Yearbook 2018*, edited by Ivan Franceschini and Nicholas Loubere, published 2019 by ANU Press, The Australian National University, Canberra, Australia.

doi.org/10.22459/MIC.04.2019.06