Upgrading the "Workshop of the World": Incentives for and Barriers to Industrial Automation in Dongguan, China

1. Introduction

In 2015, the launch of a "workerless factory" in Dongguan made headlines in China's major newspapers (Xinhua Net, 2015). On the shop floor of a mobile phone module manufacturer, conveyor belts were staffed not by dispirited and sweating workers but by robots executing repetitive pre-programmed tasks. This "futuristic" scenario, part of the Dongguan government's "Replacing Humans with Robots"[1] policy, showed that a single robotic arm could replace up to eight workers while reducing the product defect rate by more than 20%. The idea of the "workerless factory" warrants academic attention because it represents an attempt on the part of the under-technologized Global South to improve its status in the global economy through industrial automation.

Since the onset of the 2008 Global Financial Crisis, Chinese manufacturers have gradually felt pressure exerted by both declining orders from international clients and rising labor power at home. In 2014, China's economy recorded GDP growth of 7.4%, its slowest rate of expansion since 1990 (Bird, 2015). At the same time, industrial relations became more and more unstable, as evidenced by a rising labor shortage, the Foxconn suicides, and a spate of strikes following the Honda strike in 2010 (Chan 2013; Ngai and Chan 2012).

Against this backdrop, it was perhaps unsurprising to see the emergence of China's robotic revolution debut at this juncture, as a means of initiating a "socio-economic rebalancing" (Butollo and Lüthje 2017: 43). When rolling out the "Made in China 2025" policy to promote automated manufacturing in 2015, China's Premier Li Keqiang vowed that the government would address the desire to move up the innovation value-added ranks within a decade through the deployment of "intelligent manufacturing"[2] backed by automated factories and big data to develop a viable, innovation-driven growth sector to boost China's already rapidly expanding economy (Xinhua Net, 2015).

[1] The literal translation of this policy should be "replacing humans with machines" (*jiqi huanren*), but we decided to adopt the translation "replacing humans with robots" because the installation of machines alone does not make a firm eligible for the subsidy—some degree of automation is required.
[2] For a full definition of "intelligent manufacturing", please refer to "Guidance on National Intelligent Manufacturing Standard System Construction (2015)," jointly published by the Ministry of Industry and Information Technology (MIIT) and the Standardization Administration of China.

Based on the political economy of technoscience, this paper examines incentives for industrial automation and barriers that the state and capital investors encounter. Despite growing interest among science and technology studies (STS) scholars in political economy (Birch 2013; Tyfield 2014), most focus on analyzing the "information society" and "bio-technology" (Veak 2000; Helmreich 2008), rarely probing the dynamics of manufacturing technology. We seek to redress that imbalance by exploring the following questions: In the process of industrial upgrading, does "high-tech" necessarily lead to "high-end" production? Will technological change help manufacturers in the Global South move up the global supply chain and thus challenge the unequal power relations underlying the new international division of labor? What contradictions do they encounter in the automation process? How has the process of automation that emerged in the wake of the 2008 Global Financial Crisis affected Chinese laborers who have endured decades of low-wage, low-skilled employment?

In the remainder of this paper we first review the literature that has informed this research and to which this study contributes. We identify conceptual gaps in the fields to which this research contributes and demonstrate how the study contributes to those areas. Next, we briefly describe the study's methodology. The subsequent section investigates the context in which we conducted the study (Dongguan) and explains the government's plan. We then describe our findings in depth and analyze the identified features. We conclude by discussing future prospects.

2. Literature Review: The Political Economy of 'Technoscience'

Pioneers in the political economy of technoscience have unveiled how advanced machinery, rather than liberating workers, only further subjugated them (cf. Braverman 1988 [1974]); Noble 1978; Morris-Suzuki 1988). Harry Braverman in particular documents how the de-skilling of labor culminated in the 1960s as automation reinforced the hierarchical relationship between management and workers by separating concept from execution (Braverman 1988 [1974]). Similarly, David Noble demonstrates how computerized numerical control (CNC) machines facilitated the programming of machine tools and allowed managers to replace unionized, skilled machinists with non-union, white-collar employees as a way to curb labor activism (1978, 1984).

Morris-Suzuki (1988) further shows that labor organization could exert considerable input into technology policy-making. In Japan, the Nissan union demonstrated "total opposition" to the introduction of robots in the early 1970s. However, in later years, when it split along ideological lines, the union altered its policy and began cooperating with management by promoting productivity growth and worker lay-offs.

Recently, Butollo and Lüthje (2017) have begun exploring contradictions confronting the automation processes utilized by Chinese manufacturers. However, as inspirational as Butollo and Lüthje's study of advanced manufacturing is, the two cases they present are flagship enterprises with successful brand names. This leaves unmet the need to analyze the more prevalent organizational form of small and medium-sized enterprises (SMEs) engaged in original equipment manufacturing (OEM) for export.

Our research addresses such gaps in the literature in two ways. On the one hand, we combine an analysis of automation with an eye on workers. Unlike Braverman, for example, we question the role played by technology, its direction and its real relevance in the contexts in which has been deployed. In particular, we extend Morris-Suzuki's (1988) study to explore the influence yielded by labor (rather than labor organizations). We build on studies by Sartelli and Kabat (2014) to show the gaps and disruptions, the uneven and messy path(s) along which industrial upgrading actually occurs. We do this to enunciate differences in the new international division of labor and moreover to show that the path to industrial upgrading is in fact littered with obstacles and hindered by labor. In this way, our study contributes to the most recent existing literature on the subject by expanding its scope.

On the other hand, our study is one of the first to take this approach to study the industrial upgrading process in the Pearl River Delta region of Mainland China and in Dongguan in particular. Specifically, ours is the first study to focus on the manufacturing powerhouse of Dongguan among non-state-owned SMEs. Empirically, therefore, these findings are new and add to the body of studies that focus on the larger private as well as state-run Chinese firms. We introduce Dongguan in detail after explaining our methodology in the next section.

3. Methodology

We deployed a grounded approach in our study of the contradictions inherent to the industrial upgrading process among Chinese manufacturers. We conducted five months of intensive fieldwork between September 2015 and January 2016. During this period, we utilized participant-observation and conducted interviews with managers of eight robot user firms (Table 1) as well as four robot supplier firms.

The eight user firm factories, operating in the metal processing, electronics, automobile parts, furniture, and bicycle/motorcycle helmet manufacturing industries, all adopted automation machinery. Four of the eight received Dongguan government subsidies under the "Replacing Humans with Robots" program. In addition, we conducted 63 interviews with the following important stakeholders: policymakers and government officials in Dongguan, workers, labor-assisting NGO staff and volunteers, factory owners, a *New York Times* journalist who has covered this issue (Kessell and Jensen 2015), managers, and academics. As regards the workers, we interviewed workers from various categories: some working in factories where no automation was introduced but where the owners had discussed implementing automation, some working in factories where automated machinery was introduced (they had kept their jobs), and some who had been laid off as a direct result of the introduction of automation by their previous employers. In total, the participant observation and interviews spanned 178 hours of interactions (these 'interactions' included extensive time spent at the factories in participant-observation as well as in-depth interviews with the factory owners and managers, in addition to the time spent conducting the 63 interviews).

We also participated in numerous informal but closely related interactions at robot-manufacturer conferences, robot-user conferences, and casual conversations with some of the interviewees outside of 'formal' settings (while walking home after an interview was completed, on the phone for follow-up conversations, etc.). During the participant-observation phase, we video-recorded some parts of manufacturing processes (where possible), and audio-recorded interviews with owners/managers.

We collected 113 hours of audio recordings which were transcribed during the spring of 2016. These transcriptions were checked for accuracy and analyzed for recurring themes.

4. Dongguan: Recent Historical Trajectory of Industrialization and Industrial Upgrading Policies

Dongguan, located in the Pearl River Delta, hosts over 80,000 manufacturers in a 2,460 km^2 area (Gouch 2016). In 2014, the city had a population of 8.3 million, divided between 1.9 million permanent residents with urban *hukou* (household registrations) and 6.4 million rural migrants, most of whom were employed in factories (Dongguan Yearbook 2015).

In Dongguan, the electronics and information technology (IT) industry (including communication equipment) boomed after the Asian Financial Crisis in 1997, when Taiwanese contract manufacturing companies relocated their production clusters to Dongguan in response to rising labor costs in Taiwan and dwindling orders from the U.S. market. The electronics and communication equipment manufacturing industry became the largest industrial segment, registering a production value of 23.8 billion yuan for a 39.45% share, employing the largest labor force comprising 19.86% of the total labor force (Wang 2002). The IT industry in Dongguan is large, but it is not especially robust. Although the city had already become China's largest PC production base by 2004, core components still needed to be imported (Wang and Li 2004).

The prevailing OEM production model in Dongguan might have helped factory owners accrue profits quickly and easily, but it was also a volatile business model, rendering firms highly sensitive to changes in global demand and the whims of the brand names that control the ultimate sales and marketing of final products. The 2008 Global Financial Crisis ruthlessly exposed this fragility as it wreaked havoc on the local economy, resulting in negative GDP growth in the first quarter of 2009 (the first quarter of negative growth in Dongguan's 30-year history of industrialization).

It was against this socio-economic backdrop that the Dongguan government rushed to implement its industrial upgrading policy. In August 2014, the Dongguan Municipal Government passed a resolution entitled "Promotion Plan for 'Replacing Humans with Robots' for Dongguan Enterprises (2014–2016)," outlining the government's determination to salvage the economy by turning the workshop of the world into a base of intelligent manufacturing through increased automation and the use of industrial robots (Dongguan Municipal Government 2014b). In three-year's time, the plan stated, the government would allocate an annual fund of 200 million yuan to sponsor firms that were willing to adopt

1,000–1,500 automation programs, boosting productivity from 80,000 yuan to over 110,000 yuan per capita (Dongguan Municipal Government 2014a, 2014b). He Yu, the vice-mayor of Dongguan, vowed to increase Dongguan's robot intensity to over 120 units/10,000 workers by 2020 and even boost the city's own robot and automation equipment manufacturing industry (Pang and Zheng 2016).

Will industrial upgrading necessarily save the crippled local economy? Does high-tech manufacturing help Dongguan firms move higher on the global value chain? Importantly, how does the process of industrial upgrading actually occur? In seeking to answer these questions, we next consider the incentives for and barriers to industrial automation.

5. Manufacturers' Incentives for and Barriers to Automation

Although technological upgrading seems on the face of it to be an inevitable trend that benefits Dongguan's low-end manufacturing industry, in practice firms encounter a range of problems that reflect the contradictory role of technological development undertaken to maximize profits.

5.1 Improving productivity

Five firms in the electronics and information industry in our study identified productivity increases as the most important reason behind their drive for automation. For Mr. Lin, the owner of the LED backlight module supplier (Factory L), repeated industrial upgrading has become a norm, a necessity for the rapidly changing electronics industry. In 2013, intense competition in the personal computer industry forced him to enter the thriving mobile phone business. In 2015, he decided to adopt automatic die-cutting production lines. He bought three production lines from a local supplier for 700,000 yuan per line and even created a dust-free workshop. The total investment totaled more than 3 million yuan. We inquired into his motivation for switching from personal computers to the mobile phone industry:

> I switched because of its [cell phone] quantity. Look at our present orders. Our clients place orders of 1KK, million by million. In comparison, we received an order for only tens of thousands each month for PCs. The difference is significant. We still have a few workshops making PC materials, which do not require a dust-free environment. However, the production value is not high.

Factory L produced 100,000 sets of optical sheets every day, for a total of 2.6 million sets per month (26 working days) in a factory with only 120 workers. The high output volume was an outcome of repeated equipment upgrading. Since the factory was built in 2007, Mr. Lin initiated three major upgrades in the facility. He further explained that 'upgrading" did not mean modifying existing equipment, but rather *replacing* old machines with new ones.

A second, perhaps somewhat counter-intuitive, reason to automate was low profit margins. Previously in Factory L each die-cut machine needed one operator, who placed a piece of film on a machine, punched a key, and cut the sheet into a specific shape. Now, the automation system punched a roll of film continuously, improving efficiency more than 10 times compared with the previous level. The urge to increase productivity came from Factory L's falling profits. The price of its products was now less than one-fifth that of 2007. Moreover, the efficiency boost was more a demand than a choice. Mr. Lin said:

> In China, the cell phone industry has always witnessed [price] drops. On average, we encounter a price reduction every two months, sometimes even once per month. It [the industry] places very high demand on us. A new model takes only half a year from investment to production. After half a year, it is very possible that the model has already disappeared [from the market], especially for smaller brands. In this situation, the factory has to be highly adaptable. It requires you to perform mass-quantity production, because in half a year you will have to change to produce new models.

Presently, Factory L can, with only 120 employees, produce LED module sets for 2.6 million mobile phones per month, or 31.2 million per year. Less than 250 such factories would produce enough mobile phone components annually for the global population of phone users. Yet, Mr. Lin estimated the number of competitors in Dongguan alone as exceeding 100. In this way the electronics and IT industry faces an encroaching crisis of overcapacity, a conundrum for firms in the global value chain that Mr. Lin recounted as follows:

> As a processing factory, we don't have any bargaining power. . . . The key is that in the Pearl River Delta of China, there are numerous factories like us. The problem of overcapacity is very severe, making it difficult for factories to get a share of orders. When a firm fails to get enough orders, it will choose to lower prices, expecting lower

profits.

In Factory L, automation reduced the workforce from 20 to only three workers per line, an alarming 85% replacement rate. So far, however, the replaced workers have not been laid off, with most having been transferred to the quality control department, as this department still relies on manual labor to inspect products under bright lights. However, there is no guarantee that the quality control department will not be automated in the future.

5.2 Upgrading quality

Unlike Mr. Lin, who repeatedly upgraded his factory machinery to achieve higher productivity, Mr. Zhou was well aware that automation increased not only a firm's productivity but also its competitors' efficiency. Therefore, he set up Factory M in 2013 to achieve a quality upgrade rather than a quantity expansion. Factory M is now registered as a "private science and technology enterprise" (*minying keji qiye*), a category of legal entity that was set up under a 1994 regulation designed to encourage academics and professionals to open startup companies. As an engineer himself, Mr. Zhou chose to demonstrate his competitive edge through "differentiation" (*chayi hua*) in quality. When we visited his factory in December 2015, he greeted us in his conference room lined with product samples. "I targeted high-end parts," he said as he began a two-hour introduction to his company.

In 2013, Mr. Zhou set up Factory M when he decided to quit a business co-owned by Hong Kong partners. Factory closures following the 2008 Global Financial Crisis had left much of the shop floor space vacant. After leasing a more than 2,000 m^2 space in an industrial district in Dongguan, he purchased brand-new CNC machines, including 14 Japanese brands and 16 Taiwanese brands. There were one 5-axis machine, 17 4-axis machines, and the rest are 3-axis machines.

Mr. Zhou noted that upgrading was effectively compulsory in the high-precision metal processing industry. The 4- and 5-axis CNC machines can process metal parts along four or more dimensions, saving the step of unloading a half-processed product from one machine and reloading it on another machine.

While high-end CNCs might help Mr. Zhou improve product quality, he does not attribute his competitiveness to the machines alone:

> I use relatively advanced equipment and a good production process (*gongyi*) to compete with others. There are more advanced machines sold at 1 million to 2 million yuan per unit. I can't afford them. Machinery is something everybody can buy, but a production process needs to be designed. One component is hardware and the other is *software*.

These remarks reflect the need to train skilled workers who can participate in designing the production process.

At the time of this study, there were approximately 50 employees at Factory M, with the manufacturing department the largest, involving more than 40 people. Among those 40, about 30 are CNC operators who work two shifts, overseeing the factory's 30 CNC machines. Depending on cycle time, the time required to load and unload each product, one operator is assigned to control between three and five CNCs. One supervisor is assigned for each shift, comprising workers from various ranks (see Table 2).

Mr. Zhou established the apprentice track to train skilled workers who can handle tasks such as changing fixtures and jigs, adjusting CNCs for new tasks, and eventually participating in designing the production process. Before a new employee signs an employment contract, he or she has to choose between the operator track and the apprentice track. Operators are paid nearly 3,000 yuan a month. In contrast, an apprentice will receive the entry-level monthly salary of only 2,000 yuan, which rises to 2,500 yuan in 3 months, and 3,000 yuan in six months, and so on. However, an operator has virtually no upward occupational mobility, whereas an apprentice can be promoted all the way to 'Technician I'.

The in-house apprenticeship training program that Mr. Zhou established in his company represents an exceptional case for China's SMEs which, for decades, have been content with labor-intensive, low-value-added, but relatively lucrative OEM-production that discourages the development of a skilled labor force (Klorer and Stepan 2015). Actually, this notion came from Mr. Zhou's long-time experience working at *danwei*, both at a state-owned mining research institute and at its affiliated coal-mining machinery factory, from 1979 to 1997.[3]

[3] *Danwei* (work unit) refers to socialist workplaces whose employees were guaranteed economic benefits such as secure jobs, affordable housing, and generous retirement pensions (L*ü* and Perry 1997).

The lack of a skilled labor force has been identified as a main obstacle to China's drive towards intelligent manufacturing (Luethje 2016; Ernst 2016). In 2016, Premier Li introduced the concept of the "craftsman spirit (*gongjiang jingshen*)" during his government work report and emphasized its importance to the "Made in China 2025" plan (Wei and Danning 2016). Demand for vocational workers was expected to reach 79 million in 2020, with supply at only 63 million, leaving a gap of 16 million, a stunning 20% shortage (Chen et al. 2013). While both the state and SMEs see the need to expand technical and vocational training, it is still a much-debated issue as to who should assume responsibility for providing it.

5.3 Transitioning from Original Equipment Manufacturing (OEM) to Own Brand Manufacturing (OBM)

Prior to conducting our research, Mr. Zhou's company was running well in terms of profitability. However, due to gradually decreasing demand for high-precision parts, he was nevertheless worried about maintaining long-term orders. Despite his background in engineering, he has not been able to move the firm up the value chain, as he is still confined to manufacturing components and parts. Here, we present a third type of industrial upgrading in which Mr. Lin and Mr. Zhou have not engaged, which serves the purpose of ascending the value chain—especially in terms of brand development—rather than serving the purpose of increasing output or increasing quality/precision.

Recently, in both media and academic discussions of industrial upgrading and the "Made in China 2025" plan, the term "smile curve" has gained popularity (Wang 2015; Mao and Zheng 2012). The concept of the smile curve implies that, along the value chain of the personal computer industry, upstream R&D as well as downstream brand-based marketing can yield more added value as compared with mid-stream assembly and processing activities (Wei et al. 2010; see Figure 1).

Other scholars propose an OEM–ODM (original design and manufacturing)–OBM (own brand manufacturing) developmental trajectory and argue that latecomers should follow this path of "technological learning" by developing processing capabilities first, followed by product design capabilities and finally their own product/branding capacities (cf. Hobday

2000; Liu, Liu, and Lin 2008). The smile curve thesis espouses the benefits of foreign direct investment in facilitating the spillover of innovation and helping developing countries achieve productivity growth. However, the smile curve thesis fails entirely when it comes to addressing the challenges created by the inequality of the new international division of labor that started in the 1980s when multinational corporations outsourced their production lines overseas and utilized cheap sources of manufacturing labor in developing countries (such as China) to overcome long-term economic stagnation and attain global monopoly profits (Xue and Chan 2013).

In our research, several manufacturers we interviewed complained about the low profit margins experienced by OEM factories, irrespective of whether they operate as a components suppliers or engage in assembly operations. Mr. Guan of Factory H, for example, told us that if his company sold a motorcycle helmet for the US$25 ex-factory price, the retail price is typically six times higher. Similarly, Mr. Wang of Factory C, which has tried very hard to develop its own brands, recognized that OEM accounted for only 30% of product value, while 70% of that value is captured by brand owners for design, development, and marketing.

With a net profit rate of only 3–4%, Factory H is now also trying to develop its own-brand bicycle helmet for the domestic market. In fact, it has elevated to ODM and developed a strong R&D foundation. Mr. Guan, the vice-manager, explained to us the incompatibility between OEM/ODM and OBM.

> Some of the top brands in sports helmets have asked us to produce their helmets. If I create my own brand, they won't be willing to give orders to me. If you were the top brand, would you give me an order? Obviously, you won't! Why not? Because how does the top brand manufacturer know that I won't copy him? The[y] [top brand manufacturer] don't know that. But to be safe, they won't give me any orders, [thereby] not sharing knowhow with me. And when that happens, we receive orders only from second- and third-tier brands who want to make use of me, utilize my R&D capacity to create better products for themselves. That won't work as a long-term solution for my company's operations.

The 'knowhow' involved with helmet design includes safety protection, knowing which light-weight materials to use and where (in the helmet, without compromising safety), and creating a fashionable appearance. Mr. Guan explained that, for the own-brand that they targeted for the domestic market, they cannot use any of the 'knowhow' that their clients possess. Moreover, they also need to clearly report the 'knowhow' involved in the new design of their domestic brand to their clients and obtain their approval.

Factory H produced the entire helmet from scratch. Despite that, they know very well that their clients are able to keep the essence of their technology a secret. Some scholars argue that the new international division of labor will reduce global inequality in technological development when advanced multinationals consider technology spillovers to developing countries which are gradually catching up in their competencies. Over time, firms that carry out low-value-added functions seek to move up the value chain by developing their own brands (Mudambi 2008).

However, in recent years, critics have shown that the accrual and benefits of such spillovers is far from a straightforward or linear, evolutionary process. Rather, in actual fact, the benefit to developing countries is either limited or at best uneven, depending on the sector in question (Rodrik 1999; Xu and Sheng 2012). Our research has shown how OEM status actually limits a firm's brand development capacity and suggests that global inequality in technology and labor might be intensified under the new international division of labor.

Although it seems unlikely that technological change itself can help Factory H overcome this OBM barrier, the management team still feels an urgent need to introduce industrial robots. The factory was established in 2011 and began mechanizing manufacturing in 2014 by adopting automated painting, CNCs, robotized bicycle helmet venting-hole cutting, and other automated equipment. They reported an investment of 4.5 million yuan and reduced the workforce from 93 to only 36 workers, a displacement rate of 59%, while productivity more than doubled and the product qualification ratio also improved.

The main incentive for automation derives from difficulties in recruiting younger workers who are willing to endure the noisy, dusty, injury-prone environment of the shop floor where helmet venting holes are cut and the often toxic conditions that characterize helmet painting. From this perspective, automation benefits the employer, but it has mixed impact on workers. On the one hand, it improves occupational health and safety. On the other hand, robotization leads to deskilling, reducing the training period from six months to three days, which translates into a change from a piece rate to a time rate as well as a reduction in monthly salary from 5,000 yuan to less than 4,000 yuan.

6. Conclusions

As China begins its ‘robotic revolution,’ the mainstream media and many scholars tout the potential of industrial upgrading as means of helping China transform from the ‘workshop of the world’ to a hub for ‘intelligent manufacturing’. Built on the notion of technological determinism, they champion the role of technology in helping the manufacturing sector to both move up the global value chain and manage rising labor costs. Rather than assuming a Whiggish perception of technology as ‘progress’, we might need to adopt a dialectical approach to analyzing the contradictions that technological development entails.

In countries of the Global North, automation took off in the 1960s and 1970s with ambivalent outcomes. Fordist production as well as welfare state protection enabled workers to enjoy mass consumption through mass production. However, as automation has led to unemployment and deskilling, the former labor aristocracy saw its unionized power gradually weakened as capital entering the neoliberal era utilized the global value chain and contract manufacturing to outsource production to the lower-wage Global South.

“Capitalism needs to feed off what lies outside itself in order to stave off, through constant crisis management, the falling rate of profit engendered by its internal relations” (Anagnost 2004: 194–195). China’s opening to global markets in the late 1970s coincided with the reorganization of capitalism through the ‘just-in-time’ provision of a cheap and docile labor force. Yet, the labor shortage crisis that erupted as early as 2004 revealed workers’ reluctance to be used merely as a ‘labor dividend’ to be readily exploited by global capital. After the 2008 Global Financial Crisis that forced thousands of factory closures, the Dongguan government had to launch a policy calling for industrial upgrading.

High-tech does not, however, necessarily translate to high-end or socially sustainable manufacturing. Automation has the potential to increase productivity but it is not a panacea for extricating firms from the vicious cycle of value depreciation. In terms of upgrading product quality, the adoption of advanced machinery alone might increase precision but human input in designing the production process is equally important, reflecting increased demand for skilled labor. Finally, industrial upgrading might have the potential to help (particularly electronic and information technology) firms move up the smile curve. But without challenging unequal relations structured by the new international division of labor, Chinese firms might still fail to grab a larger share of profits within the global value chain. Further research is needed to look at the transformation of both macro-level global value chain gaps as well as micro-level labor process dynamics to understand how automation might help or deter China's drive for technology-led development.

The "Made in China 2025" plan laid out a promising blueprint for leveraging industrial upgrading to help China transform from its workshop-of-the-world status to a manufacturing powerhouse within a decade. However, if China is not able to challenge the broader—and unequal—power structures along the global value chain, the expansion of the domestic market and rising mass incomes might be more viable solutions.

Immediately following the 2008 Global Financial Crisis observers suggested that China's expanded domestic market and rising mass incomes could rejuvenate the sluggish global economy (Luethje 2016). However, almost a decade has passed, and we have not seen successful results in mitigating the imbalances between rapid industrial development and low wages for the majority of the workforce. Why does China's mass production model fail to generate consumers for mass consumption? In recent years, the "middle income trap" thesis in development economics has gained currency in policy and media circles (cf. Kharas and Kohli 2011). This concept explains how a less developed economy loses growth momentum after its initial phase of rapid growth and stagnates, unable to evolve into a developed economy or make the critical transition from middle income to high income, as has happened in some Latin American and Asian countries. In China, while economists and officials acknowledge the need to push for technological upgrading, they largely blame rising labor costs or protective labor laws for hindering a country's move to a high-value economy (Cai 2011; Lou 2015; Zhuang et al. 2012). In contrast, labor sociologists argue that it is not high wages that are to blame, but the severe exploitation of labor and natural resources that prevents an economy from shifting from "extensive" to "intensive" regimes of accumulation (Lüthje 2017). Therefore, the key to rebalancing is not only to make China's economic growth more consumer-driven, but also to enforce basic institutional safeguards that improve protection of labor and environmental rights.

If Chinese workers are forever denied decent wages that enable them to access consumer goods, and if the specific feature of accumulation in peripheral capitalism remains unchanged (Amin 1974, Jha et al. 2017), then automation might lead to such unwelcome consequences as dwindling profits, overcapacity, and social misery, rather than serving the needs of the people. It remains to be seen whether China's case will offer important lessons for the Global South, which is rapidly industrializing as it aspires towards a more socially sustainable model of development.

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