MADE IN CHINA 2025: IMPLICATIONS OF ROBOTIZATION AND DIGITALIZATION ON MNC LABOR SUPPLY CHAINS AND WORKERS' LABOR RIGHTS IN CHINA

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I. INTRODUCTION

Multinational companies (hereinafter the "MNC(s)") operating their labor supply chains in China must determine if their business will benefit from China's current push to robotize certain manufacturing industries by 2025.[1]

Despite the huge challenges, countless manufacturers in China are planning to transform their production processes using robotics and automation at an unprecedented scale. In some ways, they don't really have a choice. Human labor in China is no longer as cheap as it once was, especially compared with labor in rival manufacturing hubs growing quickly in Asia … [O]ne solution, many manufacturers—and government officials—believe, is to replace human workers with machines.[2]

Over the coming decades, a labor shortage will force Western brands to remake their China operations or pack up and leave. The changes will mark a new chapter in the history of globalization, where automation is king, nearness to market is crucial and the lives of workers and consumers around the world are once again scrambled.[3]

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[1] For a brief introduction, *see* Scott Kennedy, *Made in China 2025*, CTR. STRATEGY INT'L STUD. (June 1, 2015), https:// www.csis.org/analysis/made-china-2025.

[2] In Shanghai, the "Cambridge Industries Group, faces fierce competition from increasingly high-tech operations in Germany, Japan, and the United States. To address both of these problems, CIG wants to replace two-thirds of its 3,000 workers with machines this year." CIG Gerald Wong stated, "It is very clear in China: people will either go into automation or they will go out of the manufacturing business." Will Knight, *China Is Building a Robot Army of Model Workers*, MIT TECH. REV. (Apr. 26, 2016), https://www.technologyreview.com/s/601215/china-is-building-a-robot-army-of-model-workers/.

"Three-quarters of all industrial robots operate in four sectors: computers and electronic goods; home appliances and components; transportation equipment; and machinery. That's partly because automation makes financial sense in these industries and partly because of the limited nature of the existing technology." Ben Bland, *China's Robot Revolution*, FIN. TIMES (June 6, 2016), https:// www.ft.com/content/1dbd8c60-0cc6-11e6-ad80-67655613c2d6.

[3] Kathy Chu & Bob Davis, *As China's Workforce Dwindles, the World Scrambles for Alternatives,* WALL ST. J. (Nov. 23, 2015), http://www.wsj.com/articles/as-chinas-workforce-dwindles-the-world-scrambles-for-alternatives-1448293942. On the other hand, other views have been expressed. "Indeed, the concern among lower-income countries is precisely that, while China moves up the value chain and acquires new comparative advantages, it continues to encapsulate within its borders the wage-sensitive chunks of the cross-border supply chain. Thus, the fear is that China, being a vast country of multiple regions with varying endowments, is not only acquiring new comparative advantages, but also keeping its existing ones, whereby China would straddle the full span of technologies and labor intensities." Philip Schellekens, *A Changing China: Implications for Developing Countries*, WORLD BANK (May 2013), http://siteresources.worldbank.org/EXTPREMNET/Resources/EP118.pdf. (quoting YUSUF,

The intersection of digitalization and labor and employment laws raise issues that are both old and new.[4] Labor unions and employees have dealt with the impacts of *automation* for generations. Now that comes in dynamic waves, however, with *digitalization* and *robotization* of the workplace.[5] It is referred to as the fourth industrial revolution using the breakthrough technology of cyber physical systems.[6] In Germany this revolution is led by the Government and called *Industrie 4.0* and it "connects embedded system production technologies and smart production processes to pave the way to a new technological age which will radically transform industry and production value chains and business models (e.g. "smart factory")".[7] In China, this government-led industrial revolution is called *Made in China 2025*.[8] It is argued that the

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SHAHID & KAORU NABESHIMA, CHANGING THE INDUSTRIAL GEOGRAPHY IN ASIA: THE IMPACT OF CHINA AND INDIA (Washington, DC: World Bank, 2010).)

[4] *The Future of Jobs Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*, WORLD ECO. F. (Jan., 2016), http://www3.weforum.org/docs/Media/WEF_Future_of_Jobs_embargoed.pdf. *See also* Melody Guan, *Rise of the Robotic Workforce*, HARV. POL. REV., *available at* https://www.linkedin.com/pulse/rise-robotic-workforce-melody-guan.

[5] "Is it automation or digitalization? Is there really a difference? Or is it just a matter of degree? You could argue that digitalization is just extending automation. However, Gartner uses 'digitalization' to emphasize that the goal is to create and deliver *new* value to customers, not just to improve what is already being done or offered. Take for example a nurse's clipboard, used for bedside patient monitoring in hospitals. Simply replacing the paper forms with tablet devices is not in itself digitization. Of course, there are benefits in doing this, such as faster and more accurate data entry into the electronic health record system than could be achieved with manual transcription. However, what if we redesigned the work using smart machines and the Internet of Things? Machines can do most of the monitoring, data collection and incident reporting, leaving nurses to do things only humans do well, like touch, talk, observe and empathize. The machines can monitor patient vital signs continuously, potentially alerting the nurse to a problem sooner than might otherwise have occurred with only periodic checks. The end result is a better outcome for the patient — and the nurse." Susan Moore, *Digitalization or Automation — Is There a Difference?* GARTNER (June 12, 2015), http://www.gartner.com/smarterwithgartner/digitalization-or-automation-is-there-a-difference/. *See also* Guan, *supra* note 4.

[6] "We will have a fourth industrial revolution," says Professor Detlef Zühlke, a lead researcher in the factories of the future. And that fourth revolution is all about making factories less *stupid*. *See* James Temperton, *A 'fourth industrial revolution' is about to begin (in Germany)*, WIRED (May 21, 2015), http://www.wired.co.uk/article/factory-of-the-future. *See also Cyber Physical Systems and Industry Digitalization*, 2B1ST CONSULTING (Apr. 7, 2015), http://www.2b1stconsulting.com/future-of-manufacturing-basics-and-mains-goals/. The preceding three industrial revolutions are 1. mechanization, water power, steam power; 2. mass production, assembly line, electricity; 3. Computer and automation. *See Industrie 4.0*, WIKI (Nov. 24, 2015), https://en.wikipedia.org/wiki/ Industry_4.0.

[7] "Smart industry or 'INDUSTRIE 4.0' refers to the technological evolution from embedded systems to cyber-physical systems. Put simply, INDUSTRIE 4.0 represents the coming fourth industrial revolution on the way to an Internet of Things, Data and Services. Decentralized intelligence helps create intelligent object networking and independent process management, with the interaction of the real and virtual worlds representing a crucial new aspect of the manufacturing and production process." *INDUSTRIE 4.0 Smart Manufacturing for the Future 6*, GTAI (July, 2014), http://www.gtai.de/GTAI/Content/EN/Invest/_SharedDocs/Downloads/GTAI/Brochures/Industries/industrie4.0-smart-manufacturing-for-the-future-en.pdf. In the U.S., similar programs are underway. *See President Obama Launches Advanced Manufacturing Partnership*, OBAMA WHITE HOUSE (June 24, 2011), https://www.whitehouse.gov/the-press-office/2011/06/24/president-obama-launches-advanced-manufacturing-partnership.

[8] Inspired by Germany's Industry 4.0, it uses "the Internet of Things to connect small and medium-sized companies more efficiently in global production and innovation networks so that they could not only

"challenge for China's industry is that it is still in transition from Industry 2.0, which is mainly assembly lines, to Industry 3.0, which uses more industrial automation, electronics and IT".[9] To reduce this huge gap, [*Made in China 2025*] encompasses upgrading objectives for process management and logistics, R&D, intellectual property rights as well as technical standards.[10]

The impact on the labor market and labor laws in China has not been addressed by this plan. "Unfortunately, within the grand vision of *Made in China 2025*, problems of work, training and workplace representation have been mostly omitted. Neither the Ministry of Labor [Human Resources] and Social Security [MOHRSS] nor the All China Federation of Trade Unions [ACFTU] participated in the drafting and related consultations."[11] Already in China, it is reported that Foxconn has replaced 60,000 workers with robots,[12] likely causing other MNC global labor supply chain systems to consider making changes to reconfigure their use of labor.[13]

The implications of digitalization on production systems, workers, and labor and employment laws are widespread and continually evolving.[14] Besides increased efficiency bringing

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more efficiently engage in mass production but just as easily and efficiently customize products." Kennedy, *supra* note 1.

[9] *See* Xin En Lee, *Made in China 2025: A New Era for Chinese Manufacturing*, CKGSB KNOWLEDGE (Sep. 2, 2015), http://knowledge.ckgsb.edu.cn/2015/09/02/technology/made-in-china-2025-a-new-era-for-chinese-manufacturing/. "Today, only about 60% of Chinese companies use industrial automation software, such as Enterprise Resource Planning (ERP). And the internet adoption ratio of Chinese SMEs reaches only 25%." *Id.* (quoting *Industry 4.0: China seizes an outstanding opportunity in the "Year of Innovation*", https://www.dbresearch.com/servlet/reweb2.ReWEB?document=PROD0000000000357355&rwnode=DBR_INTERNET_ENPROD$RSNN0000000000136502&rwobj=ReDisplay.Start.class&rwsite=DBR_INTERNET_en-PROD.)

[10] *Id.*

[11] Boy Lüthje, *Made in China 2025*, CHINA POL'Y INST. ANALYSIS (Oct. 26, 2016), https://cpianalysis.org/2016/10/26/made-in-china-2025/. Dr. Boy Lüthje is the Volkswagen Endowed Chair of Industrial Relations and Social Development at Sun Yat-sen University in Guangzhou, China.

[12] Nur Bremmen, *Foxconn replaces 60,000 workers with robots in China*, MEMEBURN (May 26, 2016), http://memeburn.com/2016/ 05/foxconn-replaces-60-000-workers-robots-china/. "The days are over for simply 'throwing more bodies at the task' to get it done. With powerful new technologies of automation, the capabilities of fewer people are magnified by robots." Cognizant, *The Robot and I: How New Digital Technologies Are Making Smart People and Businesses Smarter by Automating Rote Work*, KEEP CHALLENGING (Jan. 2015), https://www.cognizant.com/whitepapers/the-robot-and-I-how-new-digital-technologies-are-making-smart-people-and-businesses-smarter-codex1193.pdf.

[13] "China needs advanced robotics to help balance its economic, social, and technological ambitions with continued growth. The scale of this robot revolution could be enormous. Two years ago China became the world's largest importer of robots, and the International Federation of Robotics, an industry group, estimates that China will account for more than a third of all industrial robots installed worldwide by 2018." Knight, *supra* note 2.

[14] According to a McKinsey Report, "new applications of the Internet could account for up to 22 percent of China's labor-productivity growth by 2025." It further reported that "new Internet technologies are likely to automate some existing activities, but the resulting job losses can be offset by the increased wealth and consumption that the Internet generates. A previous MGI survey of more than 4,800 small and medium-sized enterprises found that as they adopted Internet technologies, 2.6 jobs were created for every job that was lost." Jonathan Woetzel et al., *China's digital transformation*,

displacement of workers with attendant unemployment, there are the issues of collective bargaining, layoffs, privacy, discrimination, wage and hour, health and safety, workers compensation, and tort liability. Additionally there are questions whether robots can replace not only workers, but also middle management.[15]

This article will examine how digitalization and robotization may affect the configuration and use of labor supply chains and the need for overseas cheap labor. Emphasis will be placed on China and its program of *Made in China 2025* as well as its possible effects on foreign MNC labor supply chains and their workers under Chinese labor laws[16] and including the "re-shoring" of MNCs, where they return to their home country using their own "cheap-labor-robots".[17] Tom Reuner, research vice president, intelligent automation, at HfS Research, stated "…companies won't have to think any more about whether to offshore back-office processes to take advantage of cheaper labor. That's because labor needs will be drastically reduced, and running a bot will cost the same — that is, not very much — everywhere."[18]

MCKINSEY (July, 2014), http://www.mckinsey.com/industries/high-tech/our-insights/chinas-digital-transformation.

[15] Interestingly, if the European Union adopts a draft plan to address the "realities" of a new industrial revolution, Europe's growing number of robot workers could be classified as "electronic persons" and their owners liable to pay social security for them. *See* Georgina Prodhan, *Europe's robots to become 'electronic persons' under draft plan,* REUTERS (Jun 21, 2016, 1:07 PM), http://www.reuters.com/article/us-europe-robotics-lawmaking-idUSKCN0Z72AY.

[16] "China rose to become the world's second largest economy and top manufacturer on the back of tens of millions of workers willing to work for very low wages. That model is changing - rapidly. 'Over the coming decades, a labor shortage will force Western brands to remake their China operations or pack up and leave," the Wall Street Journal recently wrote in a major article on this changing dynamic. "The changes will mark a new chapter in the history of globalization, where automation is king, nearness to market is crucial and the lives of workers and consumers around the world are once again scrambled." *Supply Chain News: Now, Labor Shortage is Issue in China, as Global Manufacturing Trends Likely to See Major Shifts in Coming Years,* SUPPLY CHAIN DIG. (Nov. 30, 2015), http://www.scdigest.com/ontarget/15-11-30-1.php?cid=9980&ctype=content.

[17] China is already the world's largest manufacturer, accounting for nearly a quarter of global value added in this sector. Research by Morris Cohen of the Wharton Business School finds that the country leads in many industries and that "re-shoring to the developed economies is not happening on a large scale." Even though some production is moving to countries nearer its consumers, China remains at the heart of a network known as Factory Asia. It has an excellent infrastructure and an enormous, hard-working and skilled workforce. Though wages are rising, its labor productivity is far higher than that of India, Vietnam and other rivals, and is forecast to keep growing at 6–7% a year to 2025. *Still Made in China*, ECONOMIST (Sep. 12, 2015), http://www.economist.com/news/special-report/21663332-chinese-manufacturing-remains-second-none-still-made-china. For some MNCs desiring easy access to the large Chinese domestic market there may be disincentives to re-shore to their own country or to relocate to a third country with non-robotic cheaper labor.

[18] David McCann, *Robots, Robots Everywhere*, CFO.COM (Sep. 15, 2016), http://ww2.cfo.com/applications/2016/09/robots-robots-everywhere/. Every year, the amount of time it takes for a company's investment in a robot to pay off — known as the "payback period" — is narrowing sharply, making it more attractive for small Chinese companies and workshops to invest in automation. The payback period for a welding robot in the Chinese automotive industry, for instance, dropped from 5.3 years to 1.7 years between 2010 and 2015, according to calculations by analysts at Citi. By 2017, the payback period is forecast to shrink to just 1.3 years. *See* Bland, *supra* note 2, at 2. "China's technological transformation still has far to go — the country has just 36 robots per 10,000

This article first introduced in Part I, the unfolding phenomena and significance of the fourth industrial revolution — global digitalization and robotization. Part II explains the implications of *Made in China 2025* for foreign MNCs in the context of China's declining economic situation with rising wages and a dwindling labor supply. Part III analyzes the likely impacts of *Made in China 2025* on future structures of MNC labor supply chains and the issues arising under Chinese labor laws; and Part IV concludes.

II. *MADE IN CHINA 2025* AND MNCS IN CHINA

A. The Plan

Though *Made in China 2025*[19] is about robots, these days with the "Internet of Things"[20], the robots are also included in the wave of digitalization and automation. It is said that the fourth industrial revolution integrates all of it.[21] *Made in China 2025* has been explained as an initiative to comprehensively upgrade[22] Chinese industry applying the tools of information technology to production, "primarily using the Internet of Things to connect small and medium-sized companies more efficiently in global production and innovation networks so that they could not only more efficiently engage in mass production but just as easily and efficiently customize products".[23] The program has been described as a plan by China's leadership to break out of a growth impasse, and "to leapfrog into advanced manufacturing and services". Two policy initiatives are the expression of that ambition: First, the China Manufacturing

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manufacturing workers, compared with 292 in Germany, 314 in Japan and 478 in South Korea. But it is already changing the face of the global manufacturing industry." *Id*. at 8. "China's technological transformation still has far to go — the country has just 36 robots per 10,000 manufacturing workers, compared with 292 in Germany, 314 in Japan and 478 in South Korea. But it is already changing the face of the global manufacturing industry." *Id*. at 2.

[19] For original Chinese text, *see* Guowuyuan Guanyu Yinfa <Zhongguo Zhizao 2025> de Tongzhi (国务院关于印发《中国制造2025》的通知) [Notice of the State Council on Issuing the "Made in China (2025)"] (promulgated by St. Council, May. 8, 2015, effective May 8, 2015) (Chinalawinfo). For highlights in English, *see* Lee, *supra* note 9.

[20] The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Ivy Wigmore, Internet of Things (IoT), Tech. Target, http://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT (last updated July 2016).

[21] "Digital business transformation is about doing things differently — creating new business designs by using digital technologies in combination to blur the boundary between the physical and the virtual worlds. It's not just about automating or inserting technology into an existing process. Nor is it about replacing paper or people …" Moore, *supra* note 5.

[22] *See* Dieter Ernst, *Advanced Manufacturing and China's Future for Jobs* 10 (E.-West Ctr. Working Papers, No. 8, 2016), https:// ssrn.com/abstract=2820433. *See also* Robbie Whelan & Esther Fung, *China's Factories Count on Robots as Workforce Shrinks*, WALL ST. J. (Aug. 16, 2016, 5:30 AM), http://www.wsj.com/articles/chinas-factories-count-on-robots-as-workforce-shrinks-1471339805.

[23] "The initiative draws direct inspiration from Germany's 'Industry 4.0' plan." *See* Kennedy, *supra* note 1.

2025 Plan, and, second, China's Internet Plus (IP) Plan.[24] Both seek to promote innovation-driven development through robots, 3D printing, Big Data, and the integration of manufacturing and services through the mobile Internet. In line with the 13th Five Year Plan, the goal is to upgrade China from being a "big industrial country" to a "powerful industrial country".[25]

As economic growth slows, *Made in China 2025* is a 10-year blueprint to increase China's manufacturing competitiveness and drive economic growth.[26] It emphasizes "10 priority sectors, including next-generation information technology, aerospace and aviation, agricultural machinery, new energy vehicles, and biomedicine and high-performance medical devices. It also calls for increasing China's innovation capability, quality efficiency, integration of industrialization and information technology, and green development".[27]

It is forecast that *Made in China 2025* will have many effects on MNCs, including newly increased Chinese competition.[28] At the

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[24] Speaking at the March 5 opening meeting of the National People's Congress, Premier Li Keqiang spoke of the "Internet Plus" concept in his 2015 Government Work Report. According to Premier Li's report, "Internet Plus" entails integration of mobile Internet, cloud computing, big data and Internet of things with modern manufacturing, fostering new industries and business development, including e-commerce, industrial Internet and Internet finance. Zhengfu Gongzuo Baogao (政府工作报告) [Government Work Report], St. Council. (Mar. 5, 2015), http://www.gov.cn/guowuyuan/2015-03/16/content_2835101.htm.

[25] Ernst, *supra* note 22.

[26] "China's economic miracle is directly attributable to its manufacturing industry. Approximately 100 million people are employed in manufacturing in China (in the U.S., the number is around 12 million), and the sector accounts for almost 36 percent of China's gross domestic product." Will Knight, *China Is Building a Robot Army of Model Workers*, MIT TECH. REV. (Apr. 26, 2016), https://www.technologyreview.com/s/601215/china-is-building-a-robot-army-of-model-workers/.

[27] Dan Markus & Nick Marro, *'Made in China' Now 'Made by China': Update*, THE US-CHINA BUS. COUNCIL (USCBC) (May 27, 2015), https://www.uschina.org/%E2%80%98made-china%E2%80%99-now-%E2%80%98made-china% E2%80%99-update. For the ten key sectors, *see 'Made in China 2025' plan issued*, http://english.gov.cn/policies/latest_releases/2015/05/19/content_281475110703534.htm (last updated May 19, 2015, 6:42 PM). Countries, both developed and developing, are reshaping their competitiveness as new technologies, including 3D printing, mobile Internet, cloud computing and new energy, emerge and China needs to urgently improve its ability to innovate and grasp these cutting-edge technologies, the plan states. *Id*. "Three-quarters of all industrial robots operate in four sectors: computers and electronic goods; home appliances and components; transportation equipment; and machinery. That's partly because automation makes financial sense in these industries and partly because of the limited nature of the existing technology." Bland, *supra* note 2, at 2.

[28] "Made in China 2025" is an initiative to comprehensively upgrade Chinese industry. The initiative draws direct inspiration from Germany's "Industry 4.0" plan, which was first discussed in 2011 and later adopted in 2013. The heart of the "Industry 4.0" idea is intelligent manufacturing, i.e., applying the tools of information technology to production. In the German context, this primarily means using the Internet of Things to connect small and medium-sized companies more efficiently in global production and innovation networks so that they could not only more efficiently engage in mass production but just as easily and efficiently customize products. What are the implications for MNCs? MNCs face new challenges and opportunities with this plan. In terms of challenges, a clear goal is to make Chinese companies more competitive across the board, to localize production of components and final products, and to have Chinese firms move up the value-added chain in production and innovation networks, and to achieve much greater international brand recognition. In addition, the plan calls for Chinese firms to ramp up their efforts to invest abroad, and to do so by becoming more familiar with overseas cultures

same time, there are said to be benefits for the MNCs, such as if the MNC aligns itself with a priority sector, its opportunities increase for collaborating and providing critical components, technology, and management to Chinese companies.[29]

China continues to be a top global supply chain partner with its global trade in trillions of dollars; and it is predicted that it could emerge as the world's biggest economy between 2020 and 2030.[30]

China is already the world's largest manufacturer, accounting for nearly a quarter of global value added in this sector … [E]ven though some production is moving to countries nearer its consumers, China remains at the heart of a network known as Factory Asia. It has an excellent infrastructure and an enormous, hard-working and skilled workforce.[31]

Across the globe, the configurations of MNC supply chains are dynamic, as are their effects on the corresponding links with the labor supply chains and their workers. "China now has reached a level of development where catching up through an investment-driven 'Global Factory' model is no longer sufficient to create long-term economic growth and prosperity. Chinese firms now need to adopt, absorb and develop advanced manufacturing technologies."[32] Henry Birdseye Weil, in a report for the WTO, commented on the trending changes: "dramatic changes in supply chain architectures and objectives and their associated value systems are underway, … including changes in the supply base, e.g., far more sophisticated and sustainable" and government policies in these changes are very significant. [33] "Not every supply chain is the same, of course. Nor is

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and markets, and to strengthen investment and operation risk management. *See* Kennedy, *supra* note 1. Already, China's domestic reconfigurations are making China manufactured products competitive with the products of the foreign MNCs. *See* Melissa Twigg, *China's Factory Brands: Clones or Clever Business?* BUS. FASHION (July 31, 2016, 6:00 PM), https://www.businessoffashion.com/articles/global-currents/chinas-factory-brands-clones-counterfeits-copycats-business.

[29] *See* Kennedy, *supra* note 1. Presumably, Foxconn saw advantages, such as cost-savings, as it displaced 60,000 workers with robots. *See* Bremmen, *supra* note 12. Some foreign-owned companies in China foresee entirely automated factories, creating so-called "dark factories." *See* Knight, *supra* note 26.

[30] Amita Jhangiani & Carl Stocking, *China Top Global Supply Chain Partner*, CHINA BUS. REV. 78 (2006), http://www.citigroup.com/transactionservices/home/about_us/articles/archive/2006/docs/200610cbr.pdf.

[31] "Though wages are rising, its labour productivity is far higher than that of India, Vietnam and other rivals, and is forecast to keep growing at 6–7% a year to 2025." *Still Made in China*, *supra* note 17. "China accounted for just 3 percent of global manufacturing output in 1990. Today it produces almost a quarter, including 80 percent of all air conditioners, 71 percent of all mobile phones, and 63 percent of the world's shoes." *See* Knight, *supra* note 26.

[32] Ernst, *supra* note 22, at 1.

[33] HENRY BIRDSEYE WEIL, *The Imperatives for Success in a New Market Ecology*, in GLOBAL VALUE CHAINS IN A CHANGING WORLD 176 (Deborah K. Elms & Patrick Low eds., 2013), https://www.wto.org/english/res_e/booksp_e/aid4tradeglobalvalue13_ part3_e.pdf. *See also* FUKUNARI KIMURA, *How have production networks changed development strategies in East Asia*, *in* GLOBAL VALUE CHAINS IN A CHANGING WORLD 361–83 (Deborah K. Elms & Patrick Low eds., 2013), https://www.wto.org/english/res_e/ booksp_e/aid4tradeglobalvalue13_intro_e.pdf.

every company involved in supply chains active across the same sets of activities. For example, Li & Fung [supply chain operator] manages 15,000 suppliers across a wide range of industries in over 40 countries." [34] "One risk for supply chain operators is *disintermediation* [emphasis added] — the possibility that lead firms might decide to cut out the middle-man and do things themselves at some point."[35] The efficiency and effect on a robotized workforce is of course less compared to the traditional workforce.

B. China's Economic Changes Foster MNC Restructuring

As stated above, part of China's policy motivation for *Made in China 2025* was to drive economic growth as the economy slows; therefore, it is significant to place the program in China's current economic context. The fact is that wages of workers are increasing,[36] thus pushing back on the original "cheap labor" draw;[37] additionally, the workforce has reported labor shortages in some areas and because of its aging workforce there are and will be fewer workers in the active labor pool.[38] Thus, with a possible labor shortage looming and with its working age population dropping 200 million workers in future years from 900 to 700 million, and under its *Made in China 2025* policy of introducing robotization into the manufacturing

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[34] DEBORAH K. ELMS, *Views of GVC Operators*, in GLOBAL VALUE CHAINS IN A CHANGING WORLD 163 (Deborah K. Elms & Patrick Low eds., 2013), *available at* https://www.wto.org/english/res_e/booksp_e/aid4tradeglobalvalue13_part3_e.pdf.

[35] *Id.*

[36] *Wages and Employment*, CHINA LAB. BULL., http://www.clb.org.hk/content/wages-and-employment# The%20end%20of%20cheap% 20labour? (last visited Jul. 29, 2016). For example, according to China Labor Bulletin, the minimum wage in Shanghai, which has the highest minimum wage in Mainland China, rose from RMB 1,120 per month in 2010 to RMB 2,190 (US $327) per month in 2016. Other major cities and provincial capitals have also seen increases to around RMB 1,600 (US $239) per month in 2016.

[37] "As China crosses the line from being an economy with plentiful low-cost labor to one with higher-cost workers, the implications for both China and the global economy could be far reaching." Milton Das & Papa N'Diave, *The End of Cheap Labor*, 50(2) FIN. & DEV. 34–37 (2013), *available at* http://www.imf.org/external/pubs/ft/fandd/2013/06/pdf/das.pdf.

[38] The magnitude of change is astonishing if we consider that, as of 2010, China had a surplus of 150 million laborers. The net reduction in the nation's labor supply from 2010 to 2025, according to this study, could be close to 180 million. *See How Can China Address its Looming Labor Crisis?*, FORTUNE (Feb. 6, 2013), http://fortune.com/2013/02/06/how-can-china-address-its-coming-labor-crisis/. It is reported that "those between 15 and 24 are 'the cheapest, most mobile and flexible in the Chinese workforce,' but their numbers have been declining since 2005, a situation that has led to significant wage growth and demand outstripping supply. UN data show there were 225 million people in this age group in 2010. By 2025, the number will fall by nearly 30 percent to 164 million. And in 2050, it will shrink to 124 million. A cheap and young labor force that gave China its reputation as the manufacturing capital of the world is fast eroding. Plus, China's youth are now reluctant to take up low-paying factory jobs that come with long working hours under tough conditions." Deirdre Wang Morris, *China's Aging Population Threatens Its Manufacturing Might*, CNBC.COM (Oct. 24, 2012), http://www.cnbc.com/id/49498720.

industries, the impact on labor and labor supply chains will be dramatic.[39]

Terry Gou, head of Foxconn claims "that within five years the 30% of his labor force doing the most tedious work will be replaced by robots, releasing them to do something more valuable".[40] It is reported that in Guangzhou, China, in the "world's workshop", a goal is set of "…fostering a robot-manufacturing industry with an output value of more than 100 billion yuan by 2020, as well as automating more than 80 per cent of the city's manufacturing production … [T]he provincial authorities of Guangdong said early this year [2015] they would spend 943 billion yuan on replacing human labour with robots within the next three years. Cities in the province are handing out annual subsidies of between 200 and 500 million yuan to makers of robots and to manufacturers who install robots on assembly lines … [T]he government of the city of Foshan has said the value of its automation and robotics market would reach 300 billion yuan in five years." [41]

Construction work has begun on the first factory in China's manufacturing hub of Dongguan to use only robots for production, the official Xinhua news agency reported. A total of 1,000 robots will be introduced at the factory initially, run by Shenzhen Evenwin Precision Technology Co, with the aim of reducing the current workforce of 1,800 by 90 percent to only about 200, Chen Xingqi,

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[39] According to the International Federation of Robotics, China by 2017 will have more installed manufacturing robots than any other country, and is expected to deploy some 150,000 annually by 2018, more than three times the 44,000 robots projected in the North American market that year. *See Supply Chain News, supra* note 16. Still, by another measurement, because of the huge size of China's labor force, "…the country lags far behind competitors in the ratio of robots to workers. In South Korea, for instance, there are 478 robots per 10,000 workers; in Japan the figure is 315; in Germany, 292; in the United States it is 164. In China that number is only 36." *See* Knight, *supra* note 26. One prediction suggests that man may come to assist robots rather than the opposite. "When thinking about the future of global supply chains, it is worth speculating on truly revolutionary technological developments. One such possible development concerns Computer Integrated Manufacturing (CIM). This has already produced a tectonic shift in manufacturing in high-wage nations — moving from a situation where machines helped workers make things to a situation where workers help machines make things. Perhaps manufacturing will be called 'compufacturing' in the future." Richard Baldwin, *Global supply chains: why they emerged, why they matter, and where they are going*, *in* GLOBAL VALUE CHAINS IN A CHANGING WORLD 46 (Deborah K. Elms & Patrick Low eds., 2013), https://www.wto.org/english/res_e/booksp_e/aid4tradeglobalvalue13_e.pdf.

[40] *See Still Made in China*, *supra* note 17. Kirk Yang of Barclays Bank, believes the manufacturing sector is moving from "Made in China" to "Made by China." In the 1980s and 1990s most factories were owned by firms from Taiwan (like Foxconn) or the West (like Flex). Increasingly, he predicts, the sector will be run by Chinese firms. *See id.*

[41] *See* He Huifeng, *Building work starts on first all-robot manufacturing plant in China's Dongguan*, SOUTH CHINA MORNING POST (May 6, 2015), http://www.scmp.com/tech/enterprises/article/1786484/building-work-starts-first-all-robot-manufacturing-plant-chinas. Since September [2014], a total of 505 factories across Dongguan have invested RMB 4.2 billion in robots, aiming to replace more than 30,000 workers, according to the Dongguan Economy and Information Technology Bureau. By 2016, up to 1,500 of the city's industrial enterprises will have began replacing humans with robots. *See id.*

the chairman of the company's board, was quoted as saying in the report.[42]

Furthermore, fewer migrant laborers from the countryside are coming to urban jobs,[43] as they are becoming disenchanted with low-paying jobs in bad working conditions and questioning whether they will be paid. Labor shortages have long troubled the Pearl River Delta area; and, "…according to Guangdong's labour department, in March 2015 after the Lunar New Year holiday, the province needed between 600,000 and 800,000 workers. That was about the same as in 2014 but less than the 1 million shortages in 2012. In the same period in 2010, the shortage had been 2 million."[44]

Add to this the displacement of manual, cheap labor workers by robots, and there is clearly enough economic uncertainty that can affect MNC decisions to place its labor supply chains in China in its current configuration. If the use of robots is cheaper than human help, maybe robots are the solution for the MNC suppliers who can more easily turn on and off contractual needs without the concern down the chain of workers and labor standards?

MNCs operating their labor supply chains in China must anticipate these changes and also determine if their businesses will benefit from China's current push to robotize certain manufacturing industries by 2025.[45] A recent article in the Wall Street Journal described the challenge as such: "…over the coming decades, a labor shortage will force Western brands to remake their China operations or pack up and leave. The changes will mark a new chapter in the history of globalization, where automation is king, nearness to market is crucial and the lives of workers and consumers around the world are once again scrambled."[46] With the assistance of robots and the fewer number of workers needed for production, one might envision a re-making of the labor supply chain into a more automated, contractually-based and controlled subcontracting system that by eliminating large numbers of workers could efficiently produce the requirements of MNCs, without labor strikes and high

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[42] *Id.*

[43] At the same time, China is poised to lay off 6 million coal and steel workers at State-Owned-Enterprises. Will these skilled workers be available for the cheap-labor work of the MNC labor supply chains? China's minister for human resources and social security has said that China will lay off 1.8 million workers in the coal and steel sectors, part of an overall plan to reduce overcapacity and streamline state-owned enterprises. *Reuters*, citing anonymous sources close to China's leadership, puts the figure much higher, at 5 to 6 million in layoffs over the next two years. *See* Shannon Tiezzi, *China's Coming Mass Layoffs: Past as Prologue?* THE DIPLOMAT (Mar. 3, 2016), http://thediplomat.com/2016/03/chinas-coming-mass-layoffs-past-as-prologue/. Beijing is aware of the risks such massive layoffs pose for social stability, and it's already moving to control to damage. A Chinese official recently announced that the national government will set aside RMB 100 billion (US $15.3 billion) to help find new employment for those who lose their jobs to the restructuring. *Id.*

[44] He, *supra* note 41.

[45] *See* Kennedy, *supra* note 1.

[46] Chu & Davis, *supra* note 3.

absenteeism during the holidays, or substandard labor conditions down the chain. Thus, pursuant to the *Made in China 2025* program, China can be in a position to move up the value chain; and, foreign MNCs can determine their responses, as appropriate.

On the other hand, other views have been expressed. "Indeed, the concern among lower-income countries is precisely that, while China moves up the value chain and acquires new comparative advantages, it continues to encapsulate within its borders the wage-sensitive chunks of the cross-border supply chain. Thus, the fear is that China, being a vast country of multiple regions with varying endowments, is not only acquiring new comparative advantages, but also keeping its existing ones, whereby China would straddle the full span of technologies and labor intensities."[47]

One thing is certain, that there will need to be a reconfiguration in many of the traditional labor supply chains with labor and economic issues yet to be sorted out.[48]

III. IMPLICATIONS OF *MADE IN CHINA 2025* ON FOREIGN MNCS AND LABOR RIGHTS

A. Future MNC Labor Supply Chains in China?

In order to calculate the impact of *Made in China 2025* on MNCs in China, one needs to individualize the inquiry into the nature of the particular MNC, its product line, and how that fits in with China's 10 priority sectors, and the availability of potential suppliers in those areas. However, it can generally be surmised that changes will be coming due to the effects of the fourth industrial revolution. Every day, new advances are emerging in digitalization and robotization; to ignore them is to be left behind. Certainly there will be relocations, re-shoring, and holding steady with no changes until they can't.[49]

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[47] Schellekens, *supra* note 3.

[48] "China is laying the groundwork for a robot revolution by planning to automate the work currently done by millions of low-paid workers." Knight, *supra* note 13; Das & N'Diaye, *supra* note 37. For further discussion, *see* Kimura, *supra* note 33. Of course, one such re-configuration is for the MNC to manufacture at home with its own home-grown "cheap-labor-robots" suppliers and eliminate the overseas manufacturing part of its supply chain. Another route would be to relocate the manufacturing process to another country, such as Vietnam. But while some MNCs have relocated from China to countries such as Vietnam, with lower wages, some studies show Chinese workers' productivity often offsets some of the perceived benefits. And there can be considerations of wanting to stay in China to more easily access the Chinese domestic market. *See Still Made in China*, *supra* note 17.

[49] In the U.S., it is reported that there has already begun a re-shoring of call centers from the Philippines and India back to the U.S. with the work being done by robots. GARRY MATHIASON ET AL., THE TRANSFORMATION OF THE WORKPLACE THROUGH ROBOTICS ARTIFICIAL INTELLIGENCE AND AUTOMATION 25 (2014), *available at* http://documents.jdsupra.com/d4936b1e-ca6c-4ce9-9e83-07906bfca22c.pdf [hereinafter THE LITTLER REPORT (2014)] (quoting John Markoff, *The Rapid Advance of Artificial Intelligence*, N. Y. TIMES (Oct. 14, 2013), http://www.nytimes.com/2013/10/15/technology/the-rapid-advance-of-artificial-intelligence.html? pagewanted=all&_r=0.) Also, *see* Gary Marcus, *Why We Should Think About the Threat of Artificial Intelligence*, N. YORKER (Oct. 24, 2013), http://www.newyorker.com/online/blogs/elements/2013/10/why-we-should-think-about-the-threat-of-

However, the bets are on changes through reconfigurations and re-structured MNC supply chain architecture. Foreign MNCs will design ways to strategically align themselves with Chinese companies within the 10 sectors and Chinese companies will have their own domestic and foreign labor supply chains.[50]

During the coming transition, *Made in China 2025* facilitates these changes and presents challenges and opportunities to the MNCs in their future configurations of labor supply chains. And, as the MNCs enter into and engage in the fourth industrial revolution, one of the most significant issues will be — what is the impact of digitalization, robotization, and *Made in China 2025* on Chinese workers and China's labor laws?

B. China's Labor Laws and Made in China 2025: Impacts of Digitalization and Robotization on Foreign MNCs in China

From the U.S. perspective, the dilemma of introducing digitalization and robots into the workplace and its impact on existing labor law regulations has been described as follows:

> Labor law creates a minefield for unwary employers that want to integrate robotics into their workplaces … [T]he robotics revolution is transforming the workplace and the workforce … [T]he advances in robotics technology have far-reaching implications for employment and labor law policy. From wage and hour to workplace safety, the robotics revolution will impact virtually every aspect of employment and labor law … [Y]et the myriad of laws governing the workplace, many of which were written long before the robotics revolution began, have not kept pace with the rapidly developing technology.[51]

The ability of China's current labor laws to deal with the effects of automation caused by digitalization and robotization is no different. How that may intersect with MNCs' reconfiguration of their labor supply chains begins with identifying which and how labor laws may apply and will continue as a *work-in-progress*; and, in the Chinese way, "crossing the river by feeling the stones"[52]. In

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artificial-intelligence.html.

[50] *See* Kimura, *supra* note 33.

[51] THE LITTLER REPORT (2014). *See also* Daphné Valsamis et al., *The Future of Work: Digitalisation in the US Labour Market*, POL'Y DEP'T A: ECON. & SCI. POL'Y (Mar., 2016), http:// www.europarl.europa.eu/RegData/etudes/BRIE/2016/578959/ IPOL_BRI(2016)578959_EN.pdf. The European Parliament's Committee on Employment and Social Affairs requested this document for the DIRECTORATE GENERAL INTERNAL POLICIES.

[52] This phrase, made famous by Chinese Leader Deng Xiaoping, demanded that China's economic reform proceed in constant practices and with constant summarization of past experiences. *See Cross the River by Feeling the Stones*, CRI ENG. (Oct. 31, 2008),

China, there are some concerns expressed that the robot-labor issues are not being timely addressed.[53] The implications of robotization are more than theoretical, as the same effects of displaced labor are raised by China's current economic conditions affecting Chinese workers. Globally, there are some robot-specific laws, but few directly address the labor and employment issues.[54] The European Union has begun to study the legal issues of robots.[55] In a report to the European Parliament, broad recommendations were made as to how to regulate the coming infusion of robots into the workplace.[56]

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http://english.cri.cn/3126/2008/10/31/53s419839.htm. *See also* CARL BENEDIKT FREY & MICHAEL A. OSBORNE, THE FUTURE OF EMPLOYMENT: HOW SUSCEPTIBLE ARE JOBS TO COMPUTERIZATION (Oxford Univ. Press, 2013).

[53] Emmet Cole, *The Global Race to Robot Law: 5th Place, China*, ROBOTICS BUS. REV. (Oct. 19, 2012), https://www.roboticsbusinessreview.com/the_global_race_to_robot_law_5th_place_china/ ("The lack of interest in robot-related legislation and regulation in China is a problem that must be urgently addressed, says Yueh-Hsuan Weng, chief researcher at Peking University's Internet Law Center. Weng's research involves the interface between advanced technology and law, including AI & Law, Robot Legal Studies, Legal Informatics, Computational Social Sciences and Intellectual Property Management. 'In the 40-year history of industrial robots, just 1.4 million robots have been used. The Foxconn order for one million industrial robots will almost double that number. China urgently needs robot laws to tackle the serious social problems that will arise from labor replacement,' explains Weng.").

[54] Globally, the specific issue of impacts on labor laws is still a somewhat nascent topic on the agenda. *See* Emmet Cole, *Robot Law: A Global Perspective*, ROBOTICS BUS. REV. (Sep. 24, 2012), https:// www.roboticsbusinessreview.com/robot_law_a_global_perspective/. For one of the few studies of labor issues relating to robots primarily under U.S. labor laws, *see* THE LITTLER REPORT (2014). In a comment on the Report, it was observed: "Littler notes in its report that 'much of this change will come not from new laws, but from courts and regulatory agencies attempting to apply well-established labor laws to a work force and virtual workplaces that were unimaginable decades ago.' But in educating the judicial bar, regulators and legislators on the 'new workplace and practical realities' associated with robotics, Littler says that it will 'recommend against new laws and regulations unless and until the need for change is dramatic.' The report cites research that says that by 2025, half of the jobs in the United States will be performed by 'brilliant machines and intelligent systems.' States the Report: 'Robotics is the next major innovation to transform the workplace, and will have as great — if not greater — impact on how employers operate than the Internet.'" Melanie Waddell, *Rise of Robots Brings Host of Labor Law Questions*, THINK ADVISORS (Feb. 12, 2014), http://www.thinkadvisor.com/2014/02/12/rise-of-robots-brings-host-of-labor-law-questions.

[55] Pericle Salvini, *Regulating Emerging Robotic Technologies in Europe: Robotics facing Law and Ethics*, THE BIOROBOTICS INST. (Feb., 2014), http://sssa.bioroboticsinstitute.it/projects/RoboLaw. It is reported that the "European Union is home to the world's third largest robotics market (Germany) and has invested heavily in the future of its robotics industry, including research into the legal and ethical questions raised by emerging robotics. Foremost among these research efforts is RoboLaw, a $1.9 million, European Commission-funded project designed to prepare the way for the creation of legal and ethical guidelines governing robotic systems and emerging cyborg technologies. The RoboLaw consortium includes experts from engineering, law, technology regulation, philosophy, and human enhancement. Their mission is to create a 'White Paper on Regulating Robotics' containing guidelines and recommendations for the European Commission by 2014." *See* Emmet Coel, *The Global Race to Robot Law: 3rd Place, European Union*, ROBOTICS BUS. REV. (Sep. 12, 2012), https:// www.roboticsbusinessreview.com/the_global_race_to_robot_law_3rd_place_european_union/. It appears that a consortium has been formed toward that end. *See* SSSA Robolaw Team, *RoboLaw Regulating Emerging Robotic Technologies in Europe: Robotics facing Law and Ethics*, CONSORTIUM (June 2014), http://www.robolaw.eu/ consortium.htm.

[56] Mady Delvaux, *Draft Report with recommendations to the Commission on Civil Law Rules on Robotics*, COMM. LEGAL AFF. (May 31, 2016), http://www.europarl.europa.eu/sides/getDoc.do? pubRef=//EP//NONSGML%2BCOMPARL%2BPE582.443%2B0 1%2BDOC%2BPDF%2BV0//EN.

1. Layoffs

Many analysts conclude that China's economic growth will continue to slow in the years ahead. According to the American Chamber of Commerce in Shanghai, "20 percent of American manufacturers operating in China plan to lay off employees in the coming year [2017]. Indeed, the manufacturing sector — China's leading industry — could be the economy's biggest victim."[57]

The first issue that usually arises with automation is the displacement of workers which may trigger a sequence of events, including re-assignments, layoffs, dismissals, severance pay, attendant unemployment, loss of on-going social security benefits, and including illegal discrimination in implementing these personnel decisions.[58] On the other hand, notwithstanding temporary displacement, some studies, such as by the International Federation of Robotics, argue that more jobs are created than lost.[59] Those in the robotics industry support this view, and point out that "there was no proven correlation between increasing robot density and unemployment, pointing out that the number of employees in the German automotive industry rose by 13 percent between 2010 and 2015, while industrial robot stock in the industry rose 17 percent in the same period".[60] Yet, intuitively there is the certainty of displacement of workers, if not ultimate unemployment.

As business needs and strategic objectives evolve, MNCs commonly restructure their operations, often requiring significant numbers of employee terminations. In China, workers with labor contracts can have different types of employment relationships with many workers protected by the labor laws and who are not easily dismissed or laid off without cause and without severance pay.[61] Of

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[57] Allan Xu, *Handling Mass Layoffs in China's Manufacturing Sector*, CHINA BRIEFING (Mar. 17, 2016), http://www.china-briefing.com/news/2016/03/17/china-manufacturing-lay-offs.html.

[58] Garry Mathiason, *10 Areas of Labor and Employment Law Most Impacted by Robotics, Human Enhancement Technologies, & the Growth of AI*, ROBOTICS BUS. REV., https://www.littler.com/files/press/pdf/Mathiason-10-Areas-Employment-Labor-Law.pdf (last visited May 15, 2017).

[59] Peter Gorle & Andrew Clive, *Positive Impact of Industrial Robots on Employment, International Federation of Robotics*, CITESEER (Feb. 21, 2011), http://xueshu.baidu.com/s?wd=paperuri%3A%2855c5450a5f2c3b79a2bbbc945d88e8bb%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fciteseerx.ist.psu.edu%2Fviewdoc%2Fsummary%3Fdoi%3D10.1.1.397.6224&ie=utf-8&sc_us=5503885528660195423.

[60] Statement by Patrick Schwarzkopf, managing director of the robotic and automation department of the Mechanical Engineering Industry Association (VDMA) [*Verband Deutscher Maschinen- und Anlagenbau*], which has its headquarters in Frankfurt am Main, Germany, and represents around 3,200 members, making it the largest industry association in Europe. *See* Mechanical Engineering Industry Association, WIKIPEDIA, https://en.wikipedia.org/wiki/Mechanical_Engineering_Industry_Association (last visited May 15, 2017); Georgina Prodhan, *Europe's Robots to Become 'Electronic Persons' under Draft Plan,* YAHOO! TECH. (June 22, 2016), https://www.yahoo.com/tech/europes-robots-become-electronic-persons-under-draft-plan-17070 8335--sector.html.

[61] *See* RONALD C. BROWN, UNDERSTANDING LABOR & EMPLOYMENT LAW IN CHINA 151–62 (Cambridge Univ. Press, 2010); Laodong Hetong Fa (劳动合同法) [Labor Contract Law] (hereinafter referred to as LCL) (promulgated by the Standing Comm. Nat'l People's Cong., June 29, 2007, effective Jan. 1, 2008) art. 41 (Chinalawinfo).

course there are many workers in China without a labor contract, which is the means by which rights to labor standards protections are bestowed. Under the 2007 Labor Contract Law,[62] terminations due to mass layoffs of 20 or more employees or 10 percent of the workforce for a variety of reasons including "changes in production" require a 30 day notice and severance payment.[63] Under the law, certain employees receive preference for retention and all have preferential rehiring rights for six months after the termination.[64]

A proposed new Draft Regulation on Mass Layoffs issued in December 2014, was released by the Ministry of Human Resources and Social Security detailing rules providing the conditions and procedures for mass layoffs.[65] Mass layoffs are permissible only if the employer has first implemented employee retention actions that must be disclosed to the trade union (or all employees) and to the local government authority 30 days prior to its implementation.[66] The plan should include the reason, number of employees, the criteria upon which employees are terminated, and the method for paying severance to entitled employees. If the mass layoff is avoided, there may be subsidies provided by the government. Mass layoffs can be made for a variety of reasons, and can include changes in production or operation or technological reform. In China, the "…legal scheme for mass employee layoffs requires a choice between unilateral termination by the employer for redundancy and termination. A third method of a mutual separation agreement with the employee is available, [except] now the government must be notified of mass layoffs of 20 or more employees under the proposed new Draft Regulation on Mass Layoffs."[67] The layoffs must not be discriminatory.[68] The new Draft appears to mostly follow the Labor

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[62] *Id.*, art. 41(4).
[63] *Id.*, art. 46(4).
[64] *Id.*, art. 41.
[65] *Id.*, art. 41; Qiye Caijian Renyuan Guiding Zhengqiu Yijian Gao (企业裁减人员规定征求意见稿) [Draft Provisions on Enterprise Mass Layoffs] (proposed by the Ministry Hum. Resources & Soc. Security, Dec. 31, 2014) art. 18. *See Lay off the Layoffs! New Regulation in China Seeks to Limit Mass Redundancies*, SEYFARTH SHAW (May 6, 2015), http://www.seyfarth.com/ publications/CEL050615. *See also* Iris Duchetsmann & Lisa Li, *MOHRSS Called for Public Comments on the Draft Rules of Mass Dismissal*, LEXOLOGY (Mar. 24, 2015), http://www.lexology.com/library/detail.aspx?g=52b57a32-6ee2-4070-9910-61bb86641bbd.
[66] Duchetsmann & Li, *supra* note 65; Grace Yang, *China Employee Mass Layoff Laws***,** BEFORE IT'S NEWS (Dec. 14, 2015), http://beforeitsnews.com/china/2015/12/china-employee-mass-layoff-laws-2452224.html.
[67] Duchetsmann & Li, *supra note* 65. *See also Lay off the Layoffs! New Regulation in China Seeks to Limit Mass Redundancies*, SEYFARTH SHAW (May 6, 2015), http://www.seyfarth.com/publications/CEL050615.
[68] Laodong Fa (劳动法) [Labor Law] (promulgated by the Standing Comm. Nat'l People's Cong., July 5, 1994) Sec. 12 (Chinalawinfo); Ronald C. Brown, *China's Employment Discrimination Laws During Economic Transition*, 19 COLUM. J. ASIAN L. 361 (2006); *Workplace Discrimination*, CHINA LAB. BULL., http://www.clb.org.hk/content/workplace-discrimination#Laws%20&%20Regs (last visited May 15, 2017).

Contract Law provisions with a few additions. Obviously, mass layoffs can be disruptive, costly, and affect the strategic decisions of MNCs as to where they locate and with whom they connect their labor supply chain.

Unemployment Insurance will be available for the eligible workers with labor contracts.[69] Unfortunately, many of the workers at the lower end of the labor supply chain will not have labor contracts or eligibility for these benefits.[70] And for those eligible, contributions for social benefits will be disrupted during their unemployment.[71]

Training and re-training programs will need to be utilized on an increased basis for the displaced workers and for the new entrants to the labor market who need to adapt their skills to the new areas of digitalization and robotization.[72] China has had numbers of retraining programs over the years. Starting in the early 2000s, it promoted what the World Bank called "massive retraining programs" targeting

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[69] *See* Brown, *supra* note 61. The Chinese Ministry of Human Resources and Social Security stated the unemployment rate in China fell slightly to 4.04 percent in the third quarter of 2016 from 4.05 percent in the June quarter. China Unemployment Rate. *See China Unemployment Rate*, TRADING ECONOMICS, http://www.tradingeconomics.com/china/unemployment-rate (last visited May 15, 2017). However, there is much skepticism among experts as to the authentic rate of unemployment in China as the low 4.1% rate in urban areas is said to be largely unproven. *See* S.R., *Unemployment in China, Trying to Count China's Jobless*, THE ECONOMIST (Aug. 19, 2015), http://www.economist.com/blogs/freeexchange/2015/08/unemployment-china. A recent study argues: "The official unemployment rate series for China is implausible and is an outlier in the distribution of unemployment rates across countries ranked by their stage of development. There is strong evidence that this is the result of mis-measurement of the official rate." *See* Ernst, *supra* note 22.

[70] Ronald C. Brown, *Chinese "Workers without Benefits"*, 15 UNIV. RICHMOND J. GLOBAL L. & BUS. L. J. 1 (2016); Fang Lee Cooke & Ronald Brown, *The Regulation of Non-Standard Forms of Employment in China, Japan and the Republic of Korea* (Conditions of Work and Employment Series, Working Paper No. 64, 2015), http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/----travail/documents/publication/wcms_414584.pdf.

[71] *China's Social Security System*, CHINA LAB. BULL., http://www.clb.org.hk/content/china%E2%80%99s-social-security-system (last visited on May 15, 2017). Unemployment may disrupt the social programs where the employer is the sole contributor. If employer contributions to China's social benefits are disrupted, employees may lose the benefits of work related injury insurance and maternity insurance. However, employee contributions are not necessarily affected by unemployment if the employee is still able to contribute. Assuming that they have enough money to contribute, employees may continue to contribute to the employee pension fund, unemployment insurance, medical insurance, and housing fund without any disruption. Most contributions are based on the average of the wage in a particular field and can be made monthly. *See also* Ronald C. Brown, *Measuring China's Social Insurance Law Under International Standards of International Labour Organization and Influences of Social Dimension Provisions of Free Trade Agreements and Bilateral Investment Treaties,* 45 HONG KONG L. J. 651 (2015). For a summary of unemployment program and benefits in China, *see* U.S. Social Security Administration, *Social Security Programs Throughout the World: Asia and the Pacific* (2012), https://www.ssa.gov/policy/ docs/progdesc/ssptw/2012-2013/asia/china.html.

[72] *Massive retraining programs in China*, WORLD BANK EDU., http://siteresources.worldbank.org/EDUCATION/Resources/278200-1126210664195/1636971-1126210694253/Retraining_Programs.pdf; Hartmut Lehmann & K. F. Zimmermann, *Worker Displacement in Transition Economies and in China*, IZA WORLD LAB. (2014), https://www.econstor.eu/dspace/bitstream/10419/ 125245/1/iza-wol-020.pdf. "You can make the argument that robotic technology is the way to save manufacturing in China," says Yasheng Huang, a professor at MIT's Sloan School of Management, "but China also has a huge labor force. What are you going to do with them?" Knight, *supra* note 2.

laid off workers ("Three Year 10 Million Program"); the "start your own business program"; the "high skilled program"; and the regular "vocational education programs".[73] Currently, no similar programs are offered for workers affected by robotization.

Economists, in evaluating ways through which *Made in China 2025* might work, state that in the end, *vocational training* may be China's most serious skill deficiency in achieving it. "China's education system fails to address the needs of the rapidly evolving labor market, especially for skills required for advanced manufacturing and services. While university graduates can't find suitable jobs, there is a growing scarcity in many industries of well-trained and experienced skilled workers who can run smart robots, industrial 3D printers, and Internet-based information networks." [74]

Foxconn which reportedly replaced 60,000 workers by robots, said it would be retraining its workers. "[W]e are applying robotics engineering and other innovative manufacturing technologies to replace repetitive tasks previously done by employees, and through training, also enable our employees to focus on higher value-added elements in the manufacturing process, such as research and development, process control and quality control." [75] One might wonder how many of the displaced employees can qualify or be retrained for this new technology.

2. Workplace Regulations Revisited

Health and safety laws and regulations continue to be important in China even though enforcement issues still continue to exist. Particularly at the local level, the introduction of robots poses one more machinery risk to workers. These laws fall under the authority of the State Administration of Work Safety. [76] The ILO has

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[73] For these programs, training was organized among different constituencies. "Governments at all levels have established re-employment leading groups. To strengthen training, it also established reemployment training leading groups. Usually, these training leading groups are composed of delegates of government general office, labor bureau, education bureau, economic and trade commission, trade union, women association, and the communist youth league, etc. Re-employment training network that is composed of employment training centers, skilled worker schools, enterprises, and other vocational and technical training institute provide training for this program." *Massive retraining programs in China*, *supra* note 72. More recently, it has also had "targeted" programs such as aid for displaced coal and steelworkers includes career counseling, early retirement and help starting businesses. *See* Paul Tunak, *China Makes Plans for 1.8 Million Workers Facing Unemployment*, LINKED IN (Apr. 17, 2016), http://www.linkedin.com/pulse/china-makes-plans-18-million-workers-facing-paul-tunak.

[74] *See* Ernst, *supra* note 22; Diana Farrell & Andrew Grant, *Addressing China's looming talent shortage*, MCKINSEY GLOBAL INST. (Oct., 2005), http://www.mckinsey.com/global-themes/china/addressing-chinas-looming-talent-shortage.

[75] Jane Wakefield, *Foxconn replaces '60,000 factory workers with robots'*, BBC NEWS (May 25, 2015), http://www.bbc.com/news/ technology-36376966 (China is tailoring programs for its displaced coal and steelworkers); Tunak, *supra* note 73 (Aid for displaced coal and steelworkers includes career counseling, early retirement and help starting businesses).

[76] *See* BROWN, *supra* note 61, at 112.

catalogued these laws.[77] The Workplace Safety Law (2002), which provides an expanded set of responsibilities for entities in relation to work health and safety, was amended in 2014.[78] It is applicable to all businesses engaged in production and operational activities and it seems particularly relevant to labor supply chain workers at the bottom of the chain whose well-being in the workplace is often dubious. The amendments focus almost entirely on strengthening the laws against companies and "persons in charge of work health and safety" and "persons in charge of work health and safety", and seriously increase penalties on each category.[79] The new law also expands the "supervisory power of occupational safety watchdogs and local governments, especially those at township level".[80] Preventing safety and occupational diseases is also regulated by the Law on Prevention and Control of Occupational Diseases.[81] For all labor laws, the MOHRSS "establishes labor supervision work mechanisms and organizes labor supervision activities; guides local offices to supervise labor and coordinate the protection of worker

[77] The legislative structure of OSH in China is based on the Constitution, and consists of laws, administrative regulations, local regulations, departmental rules, local rules and OSH standards. The major OSH laws are Law on Work Safety, Law on Prevention and Control of Occupational Diseases, Law on Safety in Mines, Labor Law, Labor Contract Law, Fire Protection Law, Emergency Response Law and Criminal Law. The major regulations are Regulations on Coal Mine Safety Inspection, Special Regulations of the State Council on Preventing Coal Mine Accidents, Regulations on Safety Management in Construction Projects, Regulations on the Safe Administration of Hazardous Chemicals, Regulations on Fireworks and Firecracker Safety Management, Regulations on Work Safety Licenses, Regulations on Civil Explosive Products Safety Management, Regulations on Special Equipment Safety Inspection, Regulations on Safety Supervision and Management of Agricultural Machinery, Regulations on Ascertaining Administrative Responsibility in Extraordinarily Serious Safety Accidents, Regulations on Work Injury Insurance, and Regulations on Reporting, Investigation and Handling of Work Safety Accidents. *See Description of OSH regulatory framework*, INT'L LAB. ORG., http://www.ilo.org/dyn/legosh/en/f?p=14100:1100:0::NO::P1100_ISO_CODE3,P1100_YEAR: CHN,2013 (last visited May 15, 2017).

[78] Xinhua, *China's workplace safety law to take effect*, ENG. GOV. (Dec. 1, 2014), http://english.gov.cn/policies/latest_releases/2014/12/01/content_281475017759948.htm; Anquan Shengchan Fa (安全生产法) [Law on Work Safety] (adopted by the 28th Meeting of Standing Comm. 9th Nat'l People's Cong., June 29, 2002, promulgated by Order No. 70 of the President of the People's Republic of China, June 29, 2002), http://english.gov.cn/archive/laws_regulations/2014/08/23/ content281474983042179.htm.

[79] The Work Safety Law provides that an entity requires a "responsibility system," a "safety management system," and a "risk management system" and is required to implement them and establish appropriate mechanisms to ensure implementation. The penalties also include cutting the electrical power of the employer and order suspension of operations. Sun Hong, *China gets serious about safety*, NORTON ROSE FULBRIGHT (Dec., 2014), http://www.nortonrosefulbright.com/knowledge/publications/123881/china-gets-serious-about-safety. The amendments also required all companies to establish an administrative body within the company or hire a full-time employee to manage and monitor workplace safety, if such company had 100 or more employees.

[80] Roy Maurer, *Safety Rules Take Too Long*, EBSCO (2012), http://xueshu.baidu.com/s?wd=paperuri%3A%288578b8edcad0690cd69601d054c16f70%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fconnection.ebscohost.com%2Fc%2Farticles%2F76443844%2Fcritics-safety-rules-take-too-long&ie=utf-8&sc_us= 5984783307076110191.

[81] Zhiyebing Fangzhi Fa (职业病防治法) [Law on Prevention and Control of Occupational Diseases] (promulgated by the Standing Comm. Nat'l People's Cong., Oct. 27, 2001, effective May. 1, 2002) (2016) art. 15 (5) (Chinalawinfo). *See* BROWN, *supra* note 61, at 111–14.

rights; and supervises human resource and social security inspections". [82] Effective in 2017, the Ministry of Human Resources and Social Security (MOHRSS) has issued provisions for labor and social security offenses committed by all employers (foreign and domestic) to be made public, that is, "*name and shame*."[83] The following violations will be published:[84]

- Reduction or failure to pay employees' remuneration without reason
- Failure of payment or enrollment in social insurance premiums
- Violation of working hours or holiday/leave requirements
- Violation of special provisions for female and underage employees
- Violation of child labor laws
- Other labor violations which have serious negative consequences on society

Inasmuch as most MNCs highly value their public perception, as poor PR could translate into lost profits, this is but another factor to be considered in utilizing cheap labor and unreliable subcontractors in the labor supply chain.

Legislation aimed specifically at robot safety is not common globally or in China; and even the U.S.'s primary health and safety law, OSHA, has not kept current. [85] However, the "American National Standards Institute (ANSI) recently updated its existing standard governing robotics safety in 2012. The new standard harmonizes its standard with the applicable International Organization for Standardization (ISO) standards, creating a uniform industrial robotic safety standard. While these standards are not OSHA regulations and are voluntary, the agency notes that 'they do

[82] Ministry of Human Resources and Social Security (MOHRSS), ENG. GOV., http://english.gov.cn/state_council/2014/09/09/content_281474986284102.htm (last updated Sep. 3, 2014, 5:16 PM).

[83] Zhongda Laodong Baozhang Weifa Xingwei Shehui Gongbu Banfa (重大劳动保障违法行为社会公布办法) [Major Labor Security Violations Made Public Interim Measures] (promulgated by Ministry of Hum. Resources & Soc. Sec., Sep. 1, 2016, effective Jan. 1, 2017) (Chinalawinfo) [hereinafter Major Labor Security Violations Made Public Interim Measures].

[84] Dezan Shira & Associates, *Name and Shame: Employers' Labor Law Violations to be Made Public in China*, CHINA BRIEFING (Jake Liddle ed., Oct. 20, 2016), http://www.china-briefing.com/news/2016/10/20/name-shame-employers-labor-law-violations-made-public.html. "Details of the violation and verdict outcome will be made public by newspapers, magazines, television and other such media each quarter at county level, and twice yearly at provincial and national level. In addition to the measures for publicizing violations, an evaluation method of employers was detailed and released by the MOHRSS, which is based on a three-tier system. Companies that have a sound legal record are classed as tier A, and will not be routinely audited. Companies that have been taken to task for labor law violations are classed as tier B, and will be routinely audited. Those who have committed violations more serious than tier B will be classed as tier C, and will be subject to tight regulation and inspection of enforcing agencies." *See* Major Labor Security Violations Made Public Interim Measures.

[85] THE LITTLER REPORT (2014).

provide guidance from their originating organizations related to worker protection'."[86]

Outside of labor legislation, tort liability may be available for harm caused by mis-programmed or defective robots. China also has a Work-Related Accident Insurance Law[87] for covered workers, which in the case of using robots can raise interesting questions; for example, where a robot injures a worker, what is the resulting coverage under workers compensation? [88] Assuming a robot is a machine just like other machines in the workplace, the legal outcomes should be the same, but one can ask whether the robot is a "co-worker" or a defective product of a third-party company or a victim of malfeasance by an independent contractor operator hired by the employer (a third-party or a joint-employee?). Of course for the workers on the low end of the labor supply chain who may not have a labor contract and access to these benefits, different liabilities would ensue, if any. There may be some advantages for the human workers associated with using robots; if the robots are assigned to the lifting work and dirty, dangerous and difficult jobs, there may be fewer human worker injuries.

Wage disputes and strikes are eliminated vis-a-vis the robots, but the co-workers at the company may not like the displacement of fellow workers by the robots, or the faster pace of productivity of the robots, as well as their lack of participation in the profits of greater productivity, etc., and may themselves engage in protests. If the Union is involved, will it seek to include limitations on the use or effects of the robots in their collective contracts? That is a phenomenon still to be developed. Further, there is the possibility of "independent contractors" who work on operating and maintaining the robots — on location or remotely. Issues of the employment

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[86] *Id.* ISO 10218-1:2011 specifies requirements and guidelines for the inherent safe design, protective measures and information for use of industrial robots. It describes basic hazards associated with robots and provides requirements to eliminate, or adequately reduce, the risks associated with these hazards. *See* ISO 10218-1:2011, *Robots and robotic devices — Safety requirements for industrial robots — Part 1: Robots* (2011), http://www.iso.org/iso/catalogue_detail?csnumber=51330.

[87] Gongshang Baoxian Tiaoli (工伤保险条例) [Regulation on Work-Related Injury Insurance] (promulgated by St. Council, Apr. 27, 2003, effective Jan. 1, 2004) art. 5 (Chinalawinfo). Dispatch workers are covered, but independent contractors are not. *Id.*, art. 41; BROWN, *supra* note 61, at 112. China's Ministry of Human Resources and Social Security ("MOHRSS") recently implemented Opinions on Several Issues Concerning the Implementation of the Regulation on Work Related Injury Insurance (II); mostly they are "housekeeping' changes. *See* Grace Yang, *China Work Injury Insurance: A Few New Rules*, CHINA L. BLOG (Apr. 18, 2016), http://www.chinalawblog.com/2016/04/work-injury-insurance-make-sure-you-have-it-for-your-china-employees.html.

[88] Robots have caused at least 33 workplace deaths and injuries in the United States in the last 30 years. *See* John Markoff & Claire Cain Miller, *As Robotics Advances, Worries of Killer Robots Rise*, N.Y. TIMES (June 16, 2014), http://www.nytimes.com/2014/06/17/upshot/danger-robots-working.html?_r=0. Studies performed in Sweden and Japan have determined that many robot-related injuries were the result of programming, maintenance, installation or repair error. *See* Denise Johnson, *The Impact of Robots Replacing Humans in the Workplace*, CARRIER MGMT. (Aug. 27, 2015), http:// www.carriermanagement.com/features/2015/08/27/ 144510.htm.

relationship could raise liability issues under regulations relating to wages, hours, workers' compensation, third-party liability, choice of laws if on foreign soil, etc.

Robots may may well be used in middle management decisions for worker evaluations, interviewing, or supervision/surveillance.[89] It has been estimated that by 2018 there will be "*robo-bosses*" supervising more than three million workers.[90] Though legal rights to privacy in China are nascent at best, robots and digitalization and transfer of worker data may fall under applicable regulation. Discrimination issues could arise where the robotic programming results in unlawful criteria being applied in personnel decisions or where unlawful choices are made as to which workers are chosen in layoffs.[91] Most of the applications of laws in China on the effects of this fourth industrial revolution still wait to be unfolded.

Labor relations may prove to be an interesting challenge as to how the All China Federation of Trade Unions (ACFTU) responds to automation and robotization. What will be the Union's voice? The Union is known to be multi-purposed, looking after the interests of the workers, the employers, and the local and national economic and political needs. And it is still developing its approach to collective negotiations.[92] There are some provincial approaches to collective "bargaining" that could perhaps more easily enable the Union to engage employers in the issues of automation and robotization.[93] Besides the substantive topics of displacement of workers and

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[89] Somewhat dated research has found that Information Technology both increases and decreases the number of middle managers. Alain Pinsonneault & Kraemer Kenneth L., *The Impact of Information Technology on Middle Managers*, ESCHOLARSHIP (1993), http://escholarship.org/uc/item/0fp472rc#page-4.

[90] *Top Strategic Predictions for 2016 and Beyond: The Future Is a Digital Thing* (Oct. 2, 2015), https://www.gartner.com/binaries/content/assets/events/keywords/symposium/sym26/gartner_top_strategic_predictions_2016.pdf. The report is said to describe it as "Measurement of worker performance will become even more granular as smart machines become the primary means of analyzing performance. Activities and events that would be far too minuscule for human managers to track — for example, the angle at which a plate is presented to a diner, the speed at which a driver turns a corner, or the percentage of completeness that a smile reaches in front of a VIP customer — will be fodder for machines capable of uniquely powerful and granular micromanagement." Rex Huppke, *Someday, a Robot Could Be Your Boss*, CHICAGO TRIB. (Oct. 12, 2015), http://www.chicagotribune.com/business/careers/ct-huppke-work-advice-1012-biz-20151009-column.html.

[91] Legal issues might rise in unintended employment discrimination, for example: "Used in human resources, algorithms sift through resumes to find the best-qualified candidates. If the algorithm was biased against particular characteristics related to age, race, sex or any other protected category, it would run afoul of labor law. But the bias could be an unintended side effect of prioritizing 'role' over 'position' or some other seemingly innocent decision." Cameron Scott, *As Robots Evolve the Workforce, Will Labor Laws Keep Pace?*, SINGULARITY HUB (Mar. 16, 2014), http://singularityhub.com/2014/03/16/robots-entering-the-workforce-but-are-labor-laws-keeping-up//; Brown, *supra* note 68, at 361; BROWN, *supra* note 61, at 75-102.

[92] BROWN, *supra* note 61, at 44-62; *See* Ronald C. Brown, *China's Collective Contract Provisions: Can Collective Negotiations Embody Collective Bargaining?*, 16 DUKE J. COMP. & INT'L LAW 35 (2006).

[93] *See* Ronald C. Brown, *Collective Bargaining in China: Guangdong Regulation a Harbinger of National Model?*, 4 CHINA-EU L. J. 135 (2015); Ronald C. Brown, *Defusion of Labor Disputes in China: Collective Negotiations, Mediation, Arbitration, and the Courts*, 3 CHINA-EU L. J. 117 (2014).

accelerating assembly lines with increasing productivity, there are related issues of who is an "employee" for purposes of joining the union. What is the status of "*robo-bosses*", remote controllers of robots, technicians, or "independent contractors"?

In the U.S., the labor unions can bargain over "mandatory" subjects, but automation and subcontracting out work has always been one of the difficult topics to define so as to obligate the employer to bargain.[94] On the international level, the unions are also aware of the issue and have attempted international framework agreements to address arising issues on a wider basis.[95]

In Italy, for instance, the Italian Federation of Metalworkers, FIM-CISL, has recently conducted a study on automation and its impact on production systems and the potential role for unions. Due to the shift from manual tasks to planning and control, and the urgency to assess the complex relationship between humans and machines, the Italian FIM-CISL is promoting professional training as an individual right for workers, which should be included in the national collective agreement of the metalworking sector.[96]

It is argued that perhaps Germany's approach in labor relations has the best chance of success in dealing with issues of automation. "As the German model of co-determination demonstrates, workers' participation in decision-making can provide an effective solution to this issue, allowing automation and digitization to become programs for success for both employers and employees. That is why the workers' voice may be expected to become one of the main union claims in face of current transformations."[97]

Whether the ACFTU and its regional organizations will develop a formal position on the issues of automation's digitalization and robotization other than dealing with it on an *ad hoc* basis waits to be seen, as they balance the interests of the employers, the workers, and the government's programs of economic development.[98]

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[94] *See* Kenneth G. Dau-Schmidt, *Labor Law 2.0: The Impact of New Information Technology on The Employment Relationship and the Relevance of the NLRA*, 64 EMORY L. J. 1583 (2015).

[95] "The most important challenges unions from developed countries are facing today are globalization and international competition; demographic changes through migration and an ageing workforce; technological changes via elements like the sharing economy and digital innovation like automation; and the impact of climate change on jobs and the environment." Kavi Guppta, *Will Labor Unions Survive in the Era of Automation?*, FORBES (Oct. 12, 2016), http://www.forbes.com/sites/kaviguppta/2016/10/12/will-labor-unions-survive-in-the-era-of-automation/#e7fc0556920d.

[96] Guppta, *supra* note 95.

[97] *Id.*

[98] For discussion of how Foxconn dealt with the Union in its labor controversies, *see* generally, JAN DRAHOKOUPIL, RUTVICA ANDRIJASEVIC & DEVI SACCHETTO, FLEXIBLE WORKFORCES AND LOW PROFIT MARGINS: ELECTRONICS ASSEMBLY BETWEEN EUROPE AND CHINA 205 (2016); Jenny Chan, Ngai Pun & Mark Selden, *Labour protests and trade union reforms in China*, *in* FLEXIBLE WORKFORCES AND LOW PROFIT MARGINS: ELECTRONICS ASSEMBLY BETWEEN EUROPE AND CHINA (2016).

Digitalization itself raises a number of employment-related issues. For example, an employer's interest in protecting trademarks and patents can be much more easily compromised by the wave of digitalization taking place. The transfer of confidential and proprietary data, perhaps especially worrisome to foreign MNCs, places new and significant risks on employers and investors. While employees may be contractually bound, third party operators or technicians may also have access to such protected data and new protocols must be developed by lawyers and engineers to protect against inappropriate disclosure of company or confidential employee information. These problems relate to controlling workers while hacking attacks by outsiders is a whole other set of problems to be resolved by engineers and responsive programs.

Lastly, it is also reported that Europe's growing army of robot workers could be classified as "*electronic persons*" and their owners are liable to pay *social security* for them if the European Union adopts a draft plan to address the realities of a new industrial revolution. The draft motion called on the European Commission to consider "that at least the most sophisticated autonomous robots could be established as having the status of electronic persons with specific rights and obligations".[99]

IV. CONCLUSION

With the above-discussed changes occurring in China, MNCs, always in a mode of readiness for change and adaptation, may want to consider the following conclusions.

1. China's declining economic climate, with wages rising above "cheap", and the shrinking labor market, may push MNCs into re-structuring current labor supply chain configuration in certain industries.

2. *Made in China 2025* may provide new opportunities for MNCs who want to utilize the advantages of robotization in certain industries to gain further control over costs, avoid the uncertainties of labor law violations of workers down the labor supply chain, and minimize any adverse publicity resulted therefrom.

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[99] Georgina Prodhan, *Europe's Robots to Become 'Electronic Persons' Under Draft Plan*, YAHOO! TECH. (June 22, 2016), https:// www.yahoo.com/tech/europes-robots-become-electronic-persons-under-draft-plan-170708335--sector.html. VDMA (Verband Deutscher Maschinen- und Anlagenbau) is the Mechanical Engineering Industry Association, which has its headquarters in Frankfurt am Main, Germany, and represents around 3,200 members, making it the largest industry association in Europe. *See* Mechanical Engineering Industry Association, WIKIPEDIA, https://en.wikipedia.org/wiki/Mechanical_Engineering_Industry_ Association (last visited May 15, 2017). Patrick Schwarzkopf, managing director of the VDMA's robotic and automation department, said: That we would create a legal framework with electronic persons — that's something that could happen in 50 years but not in 10 years. *Id*.

3. There may be productivity gains coming from robots who don't strike, have more productive capacity, and for whom the labor laws are inapplicable, leaving adjustment to the requirements of the labor laws with the sub-contracting parties, such as the costs of unrelated human worker displacement or labor law violations.

4. MNCs may want to relocate to another country, including to "re-shore" it back to their home country, using robots rather than overseas "cheap labor".

5. The impacts of robotization and digitalization on the workforce and the ability of current labor laws to deal with it have been largely ignored up to this point.

While digitalization and robotization are moving forward at a rapid pace in China, and foreign MNCs, as always, are restructuring, relocating, and re-shoring to meet their particular needs, the impacts on labor are over-shadowed by the changing formations of MNCs and their labor supply chains. In many ways it is more of the same with workers at the end of the labor supply chain, who have the lowest wages and the worst working conditions.[100] However, if China keeps on course with its *Made in China 2025*, many of these dirty, dangerous, and difficult jobs will be replaced by robots and digitalization in the workplace, impacting MNCs and undercutting a prominent reason for their investment in China. Workers will be displaced at increasing numbers and need retraining. The concern might be that the temporary displacement of workers will be for too long a period with too many workers, thus causing labor unrest, protests, and demands on the government for solutions. These are not happy developments for the MNCs and their labor supply chains. This fourth industrial revolution looks to be evolving even faster than its predecessors, so impacts on workers, not necessarily the labor laws, may be intense unless carefully laid out plans are put into place to meet these heretofore unanticipated challenges brought on by *Made in China 2025*.

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[100] Among many reports regarding the poor working conditions of some labor supply chain workers in China, an illustration is in a China Labor Watch (CLW) report, as reported by ITUC. In 2012, Samsung had the largest number of employees working in a single country outside Korea and CLW released an investigative report on "Samsung's eight supplier factories in China employing approximately 15,000 workers. It included reports of well over 100 hours of forced overtime work per month, unpaid work, standing for 11 to 12 hours while working, underage workers, severe age and gender discrimination, abuse of student and labour dispatch workers, a lack of worker safety, and verbal and physical abuse. Moreover, workers lack of any effective internal grievance channel by which to rectify these transgressions. Samsung uses contractors to produce outmoded, cheap gadgets in China and Vietnam for markets in Africa and Asia. The cost cutting pressure can be more intense because the company has to rely on a cheap labour pool to cater to a low-margin market." *See Samsung - Modern Tec, Medieval Conditions* 19 (2016), http://www.ituc-csi.org/samsung-modern-tech-medieval; *An Investigation of Eight Samsung Factories in China*, CHINA LAB. WATCH (Sep. 4, 2012), http:// www.chinalaborwatch.org/upfile/2012_9_4/Samsung% 20Report%200904-v3.pdf.