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A New Era

Optimizing Chinese Industry in the Age of Automation



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The Business of a Better World

About This Report

This working paper shares emerging analysis and perspectives on the challenges and opportunities for business in generating and preserving quality employment during an era of rapid and pervasive technological change. It is focused on the impact of economic and industrial trends on low-skilled workers in China, particularly in labor-intensive industries like manufacturing.

This research is part of BSR's work related to the inclusive economy, which seeks to promote business action to ensure that individuals and communities can participate in, benefit from, and contribute to the economy. As such, this brief also offers insight on how BSR plans to strengthen the capacity of companies and key stakeholders to prepare for and respond to major technology trends in a way that creates more opportunity and benefits for more people and businesses. With this working paper, we seek to initiate a dialogue with companies and partners on how to embrace the inevitable age of automation in a way that benefits a larger segment of society and creates value for business.

This working paper is based on a literature review and several interviews with experts in the fields of automation and labor related to China. It also draws on BSR's industry expertise in consumer products, technology, and manufacturing, as well as our experience working on sustainable supply chain management, women's empowerment, community engagement, and labor.

This working paper was written by John Pabon and Lin Wang, with contributions from members of the BSR China team. The authors wish to thank BSR and external interviewees, as well as other BSR colleagues who provided feedback, including Jeremy Prepisci and Susan Winterberg. Any errors that remain are those of the authors. Please direct comments or questions to John Pabon at jpabon@bsr.org.

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Working papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate a timely discussion and critical feedback and to influence ongoing debates on emerging issues. Most working papers are eventually published in another form, and their content may be revised.

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Executive Summary

Following more than 30 years of dynamic growth, the Chinese miracle is beginning to slow. Since 1978, China's gross domestic product has grown by an average of 10 percent year on year.¹ The World Bank called this the "fastest sustained expansion by a major economy in history." Over the past few years, though, this growth has started to stall. Third-quarter 2016 results show economic growth of 6.7 percent, China's slowest growth in 25 years.²

China is entering a new era that will change the face of the country's industry. In response to market pressures, the government is enacting a series of changes to upgrade the country's industrial sector. These initiatives have three aims: ensure economic independence, improve domestic productivity, and evolve Chinese industry from manufacturing to service.

Here are some notable changes:

- » **Streamlined production:** China recently began experimenting with lowering barriers to investment as a means of injecting life into the economy and moving toward domestic independence. In the near term, though, this may result in massive job loss,³ particularly with moves to streamline industries with overcapacity. To spur innovation and reform, the oversight body for state-owned enterprises unveiled a US\$30 billion fund in August 2015.⁴ In the 1990s, similar reforms in this sector led to the loss of 30 million jobs. This time, as many as 6 million people may lose their jobs.⁵
- » **More robots:** President Xi is also calling for a "robot revolution"⁶ to improve domestic productivity. China is freeing up billions of renminbi for technology upgrades and industrial robotics.⁷ Leaders are planning a dramatic increase in the country's robot-to-worker ratio. China's chief manufacturing center, Guangdong, announced a US\$150 billion investment over three years to subsidize the sale of industrial robotics at 2,000 of the province's largest manufacturers.⁸ The goal? Automate 80 percent of the province's factories by 2020.⁹

¹ World Bank, 2016.

² Gough, 2016.

³ Buckley, 2016.

⁴ Ibid.

⁵ Magnier, 2016.

⁶ Bland, 2016.

⁷ Knight, 2016.

⁸ He, 2015.

⁹ Minter, 2015.

- » **From world's factory to its premier service provider:** One final piece of the government's response to market pressures is the Made in China 2025 initiative. Drawing inspiration from Germany's Industry 4.0, the initiative aims to advance China from the world's factory to the world's premier service provider. Innovation, quality, and technological investment will help drive this aim. Domestic competitiveness will help sustain the initiative over time. Through this, the government seeks to create a virtuous cycle of development, whereby automation spurs individual skills development and innovation. This will be the key to China's transition to a service economy.

These changes are well underway. With China playing the central role in global supply chains, such changes will reverberate throughout most multinational businesses.

The actions businesses take today can place them in an advantageous position vis-à-vis changing policies, automation, and economic shifts. To do so, business should support government initiatives as a partner and advisor. With millions of jobs on the line, the Chinese government understands it cannot handle this shift alone. The private sector can help by optimizing supply chains and preparing workers for the workplace of the not-too-distant future.

What These Changes Mean for Business

Shifting policies, automation, and moves toward an import-driven economy create opportunities for multinational companies with supply chains in China that can position themselves well. Today's changes, with optimization at their core, will ask companies to reconsider their supply chain relationships and how they support economic inclusion for employees. To weather the storm, the key will be finding ways to support these changes.

RECONSIDERING SUPPLY CHAIN RELATIONSHIPS

When thinking about your supply chain, remember that China is trying to shift away from low-end manufacturing and move toward a focus on service. Business now has the opportunity to enable progress and become a proponent of positive change.

You can bring your suppliers along in this evolution—and keep their doors open in the new era of Chinese industry—by embracing a strategy of investing, engaging, and preparing your company and suppliers:

- » **Invest:** Invest in knowledge, especially knowledge that relates to this changing landscape. Make sure your organization's leadership and procurement teams understand what is happening halfway around the world. Build supplier management capacity through best practice sharing and transparency. Invest in your supplier partnerships, viewing suppliers as working with you rather than for you—working hand-in-hand with suppliers, versus the outdated top-down model, will help ensure combined success.
- » **Engage:** China's competitive environment is only going to become more demanding. To be successful, you will need to understand the manufacturing capacity it will take to stay ahead. Having transparent, open dialogue with suppliers can be one means to this end. Flexibility from all sides, especially with the use of new technologies, will also become increasingly important.
- » **Prepare:** Not all sectors will feel an equal or immediate impact from this industrial shift. Some, like automotive, are already highly industrialized and automated. Others, such as apparel companies,

are highly industrialized but years away from automation due to technological constraints. Still others, like information and communications technology, sit in the middle. They are highly industrialized and poised to become automated quickly. Instead of waiting for change, prepare your business to advance change today. If your company is highly industrialized, consider educational partnerships or strategic community-relations programs. For those on the cusp of industrialization, develop programs to prepare workers now for the future workplace.

SUPPORTING ECONOMIC INCLUSION

Your company can support inclusion by investing in workers in a changing economy. This investment can result in more capable, engaged workers. Codifying practices, especially skills upgrading and reimagined mobility, into organizational systems ensures sustainable, long-term resilience.

- » **Skills upgrading:** The Chinese government is already investing in talent upgrades for its workforce. However, given how industry changes will affect millions of workers, the government will be unable to keep up with demand. The private sector can also play a part by investing in their own workers.

You can build learning and development support mechanisms to prepare your employees for future jobs. The Institute for the Future's Future Skills Report lists 11 skills that are likely to be in demand over the next decade. These include personal skills like resilience, people skills, and the ability to work in diverse teams, as well as computational skills and foresight. If your company is looking to increase its workers' skills, you can use technology to make training mobile, accessible, adaptable, and meaningful.

- » **Reimagining mobility:** Traditional mobility requires long-term investment on the part of both employee and business, as people climb the proverbial corporate ladder. This new era presents an opportunity to reimagine mobility. While upskilling prepares the labor force for the jobs of tomorrow, reimagined mobility will help reposition existing talent for success in the workplace of tomorrow, which will have fewer jobs. To prepare the workforce, your company will have to identify top talent for new types of roles outside their current scope; engage the unengaged; consider the long-term return on investment for an employee; and ensure a painless transition for workers replaced due to automation, policy, or optimization.

This working paper examines how companies can understand China's new era of industrial change and position themselves in a way that allows them to benefit from the transition. In doing so, the private sector will also ensure stability and growth for the world's largest workforce.

Introduction

China no longer wants to be just the world's factory. Government initiatives, market pressures, and economics are ushering in a new era for Chinese industry. This era will be import driven, domestically productive, and service oriented. Resource, labor, and operational optimization, coupled with reimagined concepts of supplier and worker relationships, will be the keys to success in China's new industrial landscape.

Since China has grown to become the world's manufacturing center, these changes are not only domestic issues but global ones as well. China sits at the center of global supply chains. To ensure the country's continued competitiveness on the global stage, this transition is critical. China can no longer compete on price as it once did. Places like Vietnam, Bangladesh, and the Philippines have taken on the mantle of low-cost operating centers, cutting into China's preeminence. Industrial optimization and upgrade is one way to keep ahead.

But this transition will involve growing pains and real costs, particularly for the world's largest workforce. Estimates from domestic analysts vary but point to job losses in the tens of millions during this period. Already, thousands of non-performing state-owned enterprises have shut down, leaving workers with few opportunities for reemployment. The same phenomenon is happening at factories. Although the government recognizes the difficulty, the scale of the problem is so large that officials say they cannot handle everything alone.

In 2015, BSR introduced the concept of good jobs in the age of automation.¹⁰ We believe business should be a partner in planning for and ensuring a smooth transition during this era of disruption—and companies should emphasize economic inclusion. The private sector can place itself in an advantageous position by helping the government upskill or reskill workers. This will aid those displaced by transitional changes and minimize their time spent unemployed. Business can also work across the value chain to build on and support government programs aimed at upgrading all areas of Chinese industry. In doing so, the doors to suppliers stay open and supply chains continue to flow.

Too often, business is late in understanding the implications of transitional periods. When outsourcing began in the 1990s, economic, social, and environmental consequences were rarely considered. Cost mattered most. Today's shift asks for resource optimization and threatens the employment of millions. If not fully considered it could, for example, cost a business its social right to operate. To avoid a new set of problems in the not-too-distant future, business should prepare for China's transition now.

¹⁰ For a more thorough discussion on automation's implications to the global workforce, good jobs, and business, please see: Davis Pluess, Jessica. 2015. "Good Jobs in the Age of Automation: Challenges and Opportunities for the Private Sector." Report. BSR. <https://www.bsr.org/our-insights/report-view/inclusive-economy-brief-jobs-and-automation>.

To demonstrate the potential impact of this transition, consider automation. The 2015 International Federation of Robotics¹¹ figures showed a banner year for sales. Global sales increased 15 percent over 2014, with 253,748 units sold. These figures show steady growth in global sales following the Great Recession. Numbers were up in all major markets, but 75 percent of global sales came from only five countries: China, South Korea, Japan, the United States, and Germany. China continues to be the largest market for industrial robotics. The electronics, metals, chemical, plastics, and rubber industries also are driving global sales.

The global market value for robot systems, including machines and software, is an estimated US\$35 billion. The International Federation of Robotics notes that the potential for further penetration is still high. The average global robot density in all industries except automotive is a relatively low 69 robots per 10,000 workers. Here's a breakdown of what that looks like in the markets: 92 units per 10,000 workers in Europe, 86 units in the Americas, and only 57 units in Asia.¹² This means markets like China, Malaysia, Singapore, Taiwan, Thailand, and Vietnam have yet to experience the full disruptive change that automation can bring. It also means preparation is necessary sooner rather than later.

“When the logic of outsourcing and contract manufacturing gained unstoppable momentum in the 1990s, many companies were late to consider fully the social and environmental impacts of these changes. [BSR believes] it is crucial to approach the next wave of innovation in a fundamentally different way, to maximize the broad benefits of these models and to avoid the mistakes that could also result.”¹³

—Good Jobs in the Age of Automation, BSR Report

Through words and action, the Chinese government is pushing a robot revolution, and companies are starting to value industrial robotics over human workers. Foxconn, one of the world's largest manufacturers, announced plans to replace more than 1 million workers with machines.¹⁴ In China's

¹¹ International Federation of Robotics, 2016.

¹² Davis Pluess, 2015.

¹³ Ibid.

¹⁴ Toobin, 2016.

manufacturing center, Guangdong, the provincial government has committed to automating 80 percent of its factories by 2020.¹⁵

White collar and skilled technicians are not at risk. But blue collar workers, who comprise the majority of the workforce, are at risk. Without the requisite skills, education, or government safety nets, and with fewer low-skill opportunities in manufacturing, their hope for economic inclusion and good jobs are dwindling. This could potentially lead to social unrest, destabilizing the center of global supply chains.

In China, automation is not the only factor influencing change in the industrial landscape. Through its policies and practices, the country is moving into a new era in which optimization is key. As industry transitions during this period of upgrading—whether due to resource constraints, automation, or a lack of skilled workers—it is a good time for company leaders to consider how to position their business for continued success. This will require reexamining the company's relationship with suppliers and employees.

This working paper explores some of the near-term implications of China's industrial and economic evolution. In particular, this paper reviews China's economic evolution from its opening up in the 1970s until today; explores the landscape precipitating this new era, as well as government policy responses; discusses the impact of these changes, particularly through the lenses of manufacturing and automation; and it recommends actions business can take now to plan for the Chinese landscape of tomorrow.

INCLUSIVE ECONOMY

Inclusive Economy: A Definition

BSR defines an inclusive economy as one in which all individuals and communities can participate in, benefit from, and contribute to global and local economies. In particular, an inclusive economy contributes to the ability of all individuals to lead prosperous, dignified lives while supporting broad-based economic growth. BSR defines the role of business as focusing on three pillars of an inclusive economy:

1. Creating and supporting good jobs across the value chain
2. Facilitating access to critical goods and services, especially for marginalized groups
3. Investing for prosperous communities

Read more about BSR's focus on the inclusive economy at www.bsr.org/en/expertise/inclusive-economy.

¹⁵Minter, 2015.

China's Economic Evolution

Like much of the world, China is entering a period of uncertainty about the future of work. While other developed economies are discussing the Internet of Things and Industry 4.0, China is currently on the cusp of a new era. Shifts in government policies intend to reposition China toward inclusive economic growth for all citizens. They are also a response to resource scarcity and a way for China to position itself as a leader in sustainable development.

Before exploring what these changes mean for the world's largest labor force, it's important to understand how China accomplished in 35 years what took centuries for other nations.

China's key to success is in how it developed: "[T]he development of an industrial market is a sequential process...No matter how late a nation starts its development, it must repeat earlier stages to succeed."¹⁶ These stages include: proto-industrialization, which develops rural industries; the first industrial revolution, which promotes labor-intensive mass production; and the second industrial revolution, in which the tools for mass production are produced in mass.¹⁷ As China went through this process, the country's economy evolved until it became central to global markets.

Opening China to the World

Following 30 years of socialist central planning, in the late 1970s China's paramount leader, Deng Xiaoping, opened the country's economy to the world. Terming this "socialism with Chinese characteristics," his focus was on production rather than research and development. By 1981, only 8 percent of China's research and development workforce focused on industrial research, compared to 72 percent in the United States. This focus led to dramatic increases in output. By 1984, textile production was growing 13 percent year on year. The country was also producing 10 million television sets, up from half a million in 1978.

Allowing for private ownership and entrepreneurship spawned millions of rural enterprises. In villages, the number of firms increased more than 12-fold, industrial gross output increased more than 13.5-fold, and the number of peasant-workers grew to nearly 100 million by 1988. Farmers' aggregate wage income increased 12-fold,¹⁸ lifting many of the country's 800 million farmers out of poverty.

By the end of this period, China had managed to become the world's factory. By 1987, China was a prime producer of construction materials like plate glass, and it became the world's fifth largest producer of iron

¹⁶ Yi, 2016.

¹⁷ Ibid.

¹⁸ Ibid. Exact figures: Village firms rose from 1.5 million to 18.9 million, and village industrial gross output rose from 14 percent to 46 percent of gross domestic product.

and steel. China had a shipping capacity of 700,000 million tons. At the same time, China was investing 80 percent more on rail transport than the previous five-year period. This foundation set the stage for a larger push toward mass production and economic development.

Embracing Economic Evolution

China's next era focused on mass production in labor-intensive light industries. During this period, Chinese output grew to lead the world in several areas: China became the world's largest producer and exporter of textiles, the largest producer and importer of cotton, and the largest producer and exporter of furniture and toys.¹⁹ Labor-intensive light manufacturing comprised 49 percent of total industrial output.²⁰ In the coming decade, though, heavy manufacturing and high technology would outpace these industries.

By the mid-1990s, government officials sought ways to increase efficiencies to advance the economy. Premier Zhu Rongji's reforms closed thousands of state-owned firms that were long considered exemplars of bloat. These closures resulted in a loss of approximately 18 million manufacturing jobs. When this reform period ended, employment in the sector began to rise again in both absolute numbers and share of total employment.²¹

Global Dominance and Domestic Reinvestment

Over the past decade, the Chinese middle class grew by 203 million people.²² Their drive to consume is fueled by China's global dominance. It is also fueling China's domestic reinvestment. To keep up with demand, infrastructure use and development is being put to the test. China now spends about half of its gross domestic product on centrally planned capital investments—the highest share of any country in recorded history.²³ Almost 3 million new miles of public roads,²⁴ 100,000 miles of expressways (the world's largest network),²⁵ and 12,000 miles of high-speed rail (also the world's largest network)²⁶ move goods domestically and internationally.

Today, China produces more than a quarter of global goods. This includes more than 50 percent of the world's textile fibers,²⁷ a quarter of all cars,²⁸ and more than 90 percent of the world's personal computers.²⁹ China makes 80 percent of the world's air conditioners, 70 percent of all mobile phones, and 60 percent of shoes.³⁰ The manufacturing sector also provides jobs for more than 113 million Chinese

¹⁹ Ibid.

²⁰ Chinese Association of International Trade and Economy, 2016.

²¹ Lardy, 2015.

²² *South China Morning Post*, 2015.

²³ Leonhardt, 2010.

²⁴ Yi, 2016.

²⁵ Roadtraffic-Technology.com, 2014.

²⁶ State Council of the People's Republic of China, 2016.

²⁷ FASH455, 2016.

²⁸ International Organization of Motor Vehicle Manufacturers, 2016.

²⁹ Mamta Badkar, 2013.

³⁰ *Economist*, 2015.

workers—10 times more than the United States.³¹ In 2013 alone, 27 million Chinese people entered the manufacturing sector for the first time, showing how central it is to the country's economy.

³¹ McCormack, 2016.

Toward a New Era

Powered by industrial output, China's gross domestic product has grown by an average of 10 percent year on year since 1978.³² The World Bank called this as the "fastest sustained expansion by a major economy in history."³³ Over the past few years, though, this growth has started to slow. Third-quarter 2016 results show economic growth of 6.7 percent—China's slowest year of economic growth in 25 years.³⁴

Since China has grown to become the world's manufacturing center, these market pressures are not only domestic issues, but global ones as well. The country now faces a monumental challenge. Government policies and global business practices must align and enter a new era for Chinese industry. Optimization, including in the use of resources, human capital, and operations, will be key.

Optimizing Resources

As China's population continues to grow and urbanize, efficient use of limited resources will be critical. China already consumes 60 percent of the world's concrete, 54 percent of its aluminum, and 49 percent of its coal.³⁵

The government is taking a variety of actions to respond to growing resource scarcity, consumption, and use:

- » According to the World Economic Forum, China is the world's largest green energy investor. A nationwide carbon-trading scheme will go into effect in 2017.
- » China's Action Plan for Water Pollution Prevention and Control has set 2020 as the date when 70 percent of the country's major waterways should be at a level permitting safe drinking and swimming.
- » The government is increasing enforcement of environmental protection policies to optimize resource use. Reuters reports that corporate environmental court cases are up 900 percent since 2013.

A Declining Labor Supply

China's days of plentiful, cheap labor are over. Changes in the supply and cost of labor over the past decade are a result of China's impressive growth since opening up in the 1980s.

³² World Bank, 2016.

³³ Ibid.

³⁴ Gough, 2016.

³⁵ Desjardins, 2015.

Consider some of the changes:

- » The geography of labor is changing as regional hubs attract more workers. In the past, large centers like the Pearl River Delta, Shanghai, and Yangtze River Delta would take the lion's share of labor. With policy and prices forcing industry to move inland, Chinese labor is becoming more distributed.
- » The United Nations estimates that China's population will peak in 2020. By 2050, China will have 60 million fewer children under 15 than the country does today.³⁶ Estimates also show the working age population decreasing from 1 billion in 2015, to 960 million in 2030, to 800 million by 2050.³⁷
- » China's population is rapidly aging, in line with trends across much of Asia. By 2050, there will be 329 million people age 65 and older.³⁸ Without a pension safety net, these older workers may not be able to retire. Their presence in the workforce may slow manufacturing productivity at a time when competitiveness of Chinese goods is key.

The Rising Cost of Doing Business in China

Even as labor pools decline, wages continue to increase, as shown in these trends:

- » Labor costs for the average Chinese worker have increased 15 percent year on year since 2000.³⁹ For migrant workers, wages have gone up an average of 10.3 percent annually since 2013.⁴⁰ Lagging productivity growth in China, and converse gains in developed markets, make the total costs even higher. When factoring in productivity, wages in China are only 4 percent lower than those in the United States.⁴¹ Automation and modernization can help ensure competitiveness.
- » China is also strengthening the enforcement of labor laws⁴²; wage payment; and occupational health, safety, and well-being standards. These, in turn, increase costs to a business. Some, like sink manufacturer Ying Ao, are investing in machines to replace the high cost of human labor.⁴³ Most businesses, though, will continue to work toward streamlining and conforming to national standards.
- » Some companies have decided to move operations to lower-cost, developing markets, where wages might be less than a third of the cost of wages in China's urban areas.⁴⁴ In other cases, replacing warm bodies with cold ones makes more sense. This is especially attractive given that both the cost of industrial robots and their investment payback period are decreasing every year.⁴⁵

³⁶ Kotkin, 2015.

³⁷ Bland, 2016.

³⁸ French, 2016.

³⁹ Sneader and Woetzel, 2016.

⁴⁰ Bloomberg, 2016.

⁴¹ Yan, 2016.

⁴² Melnicoe, 2017.

⁴³ Bland, 2016.

⁴⁴ Knight, 2016.

⁴⁵ Bland, 2016.

Policy Responses

In response to market pressures, the Chinese government is enacting a series of initiatives to upgrade the country's industrial sector. These initiatives have three aims: ensure economic independence, improve domestic productivity, and evolve Chinese industry from manufacturing to service.

REAGANOMICS, CHINA STYLE

In the 1980s, the United States and United Kingdom implemented supply side economic policies. The hope was that investments in capital and the removal of barriers to production would bolster economies. China recently began experimenting with what it is calling “supply side structural reform” to inject life into the economy and move toward domestic independence. Reforms include measures to cut excess capacity, shutter inefficient companies, and reward high-performing firms.

While the government has left room for interpretation, Chris Buckley of the *New York Times* wrote that, like Reaganomics, Xi's changes “include lowering taxes and reducing the government burden on investors.”⁴⁶ For Lei Jun, chief executive of smartphone maker Xiaomi, these reforms will help Chinese companies make products that can compete with imported goods. Smaller entrepreneurs see the reforms as a way to upgrade operations, turning roadside restaurants into competitors for KFC and McDonalds.⁴⁷

While welcome by many, these reforms come with potential costs:

- » One clear goal is to streamline production in industries with overcapacity, including coal, steel, cement, and other large-scale industrial products. A study by China International Capital Corp estimates these moves will leave more than 3 million people in these industries without work.⁴⁸ Since many workers in these industries are specialized, the study questions the real opportunities for new work.
- » In August 2016, the oversight body for state-owned enterprises unveiled a US\$30 billion fund to encourage innovation and reform.⁴⁹ In the 1990s, reforms of state-owned enterprises led to a loss of 30 million jobs. This time, an estimated 6 million state-owned enterprise employees could lose their jobs.⁵⁰ Conversations with human resources executives in Shanghai reveal their chief concern is how to provide laid-off workers with the soft skills and work ethic necessary for private-sector employment.

In the end, the government is banking on supply side reform as a key pillar of this new era. An article in the *People's Daily*, however, painted a stark reality: “Pain will be unavoidable, but also worthwhile. ... It cannot possibly please everyone.”⁵¹

⁴⁶ Buckley, 2016.

⁴⁷ Wong, 2016.

⁴⁸ Buckley, 2016.

⁴⁹ Ibid.

⁵⁰ Magnier, 2016.

⁵¹ Buckley, 2016.

A ROBOT REVOLUTION

To spur domestic productivity, President Xi has called for a transformative “robot revolution.”⁵² The country’s most recent Five-Year Plan includes initiatives to free up billions of renminbi for technology upgrades and industrial robotics.⁵³ Officials also want to see a dramatic increase in the country’s robot-to-worker ratio. While still comparatively low at 54 robots per 10,000 workers, by 2020, Beijing wants to see this number jump to 100 robots per 10,000 workers.⁵⁴

The provinces are following Beijing’s lead. The southern province of Guangdong, China’s chief manufacturing center, announced a US\$150 billion investment over three years to subsidize the sale of industrial robotics at 2,000 of the province’s largest manufacturers.⁵⁵ The aim is to automate 80 percent of the province’s factories by 2020.⁵⁶ China also hopes to inspire domestic robot production dominance. The government wants to reach sales of 100,000 Chinese-made robots by 2020. This is a 49 percent increase over sales in 2015.⁵⁷

These calls by the government seem to be paying off:

- » China is the world’s leading robotics market, with 27 percent of the total global supply.⁵⁸ According to the International Federation of Robotics,⁵⁹ mainland industrial robot sales grew 56 percent between 2013 and 2014, with volumes during the same period up 78 percent. In 2015, China bought 68,600 robots. This outpaces the 35,000 sold to Japan, 27,504 sold to the United States, 38,300 to South Korea, and 50,100 sold to Europe.
- » Not only is China the world’s largest robotics market, it is also the fastest growing. Georg Stieler, managing director of STM China, said robotics growth outpaces other sectors in China and will double within five years.⁶⁰ Gudrun Litzenberger, general secretary of the International Federation of Robotics, said the pace of growth is “unique in the history of robots.”⁶¹

MADE IN CHINA 2025

One final piece of China’s response to market pressures is the Made in China 2025 initiative, which aims to advance China from the world’s factory to the world’s premier service provider. It draws inspiration from Germany’s Industry 4.0 Plan to capitalize on intelligent manufacturing. China’s goal is to standardize efficiency and quality first, then improve the flexibility, efficiency, and competitiveness of domestic players. Industrial robotics play a leading role. However, as *MIT Technology Review* senior artificial intelligence

⁵² Bland, 2016.

⁵³ Knight, 2016.

⁵⁴ Sneader and Woetzel, 2016.

⁵⁵ He, 2015.

⁵⁶ Minter, 2015.

⁵⁷ Reuters, 2016.

⁵⁸ International Federation of Robotics, 2016.

⁵⁹ International Federation of Robotics, 2015.

⁶⁰ Automation.com, 2015.

⁶¹ Bland, 2016.

editor Will Knight points out, “this will be about more than just installing more robots in manufacturing plants.”⁶² Workers will need the skills to develop, manufacture, service, and use industrial robotics.

The State Council document⁶³ summarizing the initiative sets clear focus areas and goals:

- » **Guiding principles:** Innovation-driven manufacturing, quality over quantity, investment in green development and human capital, as well as optimization of national industrial structures.
- » **Goals:** The initiative calls for comprehensive upgrades to industry efficiencies so China can occupy the highest parts of global production chains. The initiative seeks higher levels of domestic production for export, raising the domestic content of core components to 40 percent by 2020 and 70 percent by 2025.
- » **Self-reliance:** The government will set the framework for the initiative, provide financial tools, and support the creation of manufacturing innovation centers (15 by 2020 and 40 by 2025). The initiative emphasizes that companies should become self-reliant. Effective use of market institutions, intellectual property mechanisms, and technology standards will aid Chinese business in the participation of international standards-setting.
- » **Priority sectors:** Although the goal is to upgrade all Chinese industries, the initiative prioritizes 10 sectors, including advanced information technology, automated machine tools and robotics, high-tech shipping, modern rail transport equipment, and new-energy vehicles and equipment.

Made in China 2025 is not just a means of competitive advantage, however. China aims to create a virtuous cycle of development, whereby automation spurs individual skill development and innovation. Over time, this will be the key to China’s transition to a service economy. This time, though, China is not following the traditional process of industrialization in developed countries, which involves raising incomes, creating a solid middle class on the basis of manufacturing, and then moving into a service economy.⁶⁴ The market is forcing China to do all of these things at once.

“The goal is to overtake Germany, Japan, and the United States in terms of manufacturing sophistication by 2049, the 100th anniversary of the founding of the People’s Republic of China.”⁶⁵

—Will Knight, *MIT Technology Review*

⁶² Ibid.

⁶³ Center for Strategic and International Studies, 2015.

⁶⁴ Ford, 2015.

⁶⁵ Knight, 2016.

Making Sense of the Shift

To weather this transitional period, business should embrace the same foresight and preparation it used during the periods of change China experienced before—with an important distinction. This time, the transition is not simply about moving an agricultural base into factories on the back of foreign technology. Today's changes, with optimization at their core, will ask businesses to reconsider their supply chains.

These considerations will impact all sectors, whether prioritized by the government or not. Understanding how to navigate through changing availability of resources and labor will be a critical factor in ensuring long-term sustainability.

Central to this conversation, however, is automation's impact on China's industrial landscape.

To contextualize, it is important to understand the nature of current industrial robotics. Most are preprogrammed and fixed in a single location. They are adept in situations with a uniformity of tasks. If a box is angled the wrong way or materials are stacked on top of each other, a robot is likely to become confused. Additionally, most robots are not yet designed for delicate tasks requiring extreme precision.

As such, there are certain industries better suited to automation. According to the *Financial Times*:

“...three-quarters of all industrial robots operate in four sectors: computers and electronic goods, home appliances and components, transportation equipment, and machinery. ... Other than a few cutting-edge ‘intelligent’ robots, most of these machines have to be pre-programmed for each specific task on the production line. ... Very labor-intensive tasks such as sewing garments and shoemaking have seen minimal automation so far.”⁶⁶

In the medium term, the largest impact is likely to be on the heavy manufacturing labor force. Currently, the Chinese manufacturing sector employs nearly 100 million people. It also makes up 36 percent of the country's gross domestic product. McKinsey estimates that the sector will increase by up to 22 percent by 2025.⁶⁷ These numbers are especially salient considering automation's workforce implications, particularly job loss and mobility. One example is found at the HIT Robot Group, which is developing factories that reduce the need for human labor by 85 percent.⁶⁸ Although manufacturing jobs have pulled hundreds of millions of Chinese people out of poverty, 560 million impoverished Chinese have yet to

⁶⁶ Bland, 2016.

⁶⁷ Sneader and Woetzel, 2016.

⁶⁸ Knight, 2016.

enjoy this economic miracle.⁶⁹ This means the stakes are high in ensuring continued inclusive development during this period.

To be clear, automation does not pose an immediate threat to widespread job security in China. Looking at total robot density in the manufacturing sector, Korea has 531 robots per 10,000 workers. As of 2015, China had reached 49 units per 10,000 workers. Aspirations are to reach 100 units by 2020. Even if Chinese industry surpasses this, it will not result in a flood of displaced workers.⁷⁰ However minimal, business should consider the impact these changes will have on supply chains and employees.

As stated earlier, automation's impact will also vary by industry. Highly automated industries, such as automotive manufacturing, will feel less of an impact, as their move to robotics is well underway. It will take years for robots to replace humans in industries such as apparel, which require precise skills and flexibility. Reid Hoffman, executive chairman of LinkedIn, reminds us that shifting to machines requires massive changes: "When they set up the machine line and it's all machines, there is a huge amount of retooling to shift from line one to line two, whereas people are much [easier] to shift."⁷¹

Even with a concerted push by companies, there is still difficulty automating operations. Foxconn, the world's third-largest employer and maker of Apple and Samsung products, announced in 2011 that the company would have 1 million more industrial robots by 2014. As of today, the company has been able to add only about 30,000 per year.⁷²

⁶⁹ Bland, 2016.

⁷⁰ International Federation of Robotics, 2016.

⁷¹ McKinsey Global Institute, 2014.

⁷² Toobin, 2016.

A Call to Action for Business

Business can take action today to take advantage of opportunities created by China's changing policies, automation, and the country's move toward an import-driven economy. The key is to find ways to support these changes, whether through optimization of supply chain operations and relationships or the development of workers toward economic inclusion.

Supporting Your Supply Chain

China's transition is intrinsically linked to supply chains. What follows are suggestions to help your suppliers weather these changes, which can be a key indicator of your own business success.

KEEPING THE DOORS OPEN

As China moves away from low-end manufacturing to focus on service, thousands of state-owned enterprises and factories are shutting down. By keeping factory doors open, business can enable progress.

This will take different forms of investment:

- » **Invest in knowledge**, especially of this changing landscape. Don't assume factories are up to date or have the right interpretation of policies and practices. In an era of hyper-transparency, it is no longer realistic for business to claim ignorance of supplier practices. Educate your organization's leadership and procurement teams. Then build the capacity of your supplier management teams by passing on this knowledge.
- » **Invest in partnerships**. Do you view your suppliers as working for you, or with you? Investing in partnerships results in mutually beneficial progress. For factories not in compliance with the law, help them get there. For those not ready for the impending change, give them the formula to prepare. If a factory lacks the financial means, consider how your orders affect this. To ensure combined success, work hand in hand with your suppliers, versus using the outdated, top-down model.

STAYING COMPETITIVE

As Chinese industry upgrades, the competitive environment will become more demanding. With fewer companies doing higher-quality work, how do you ensure your supply chain partners keep pace?

Competitiveness comes down to understanding the manufacturing capacity it is going to take to stay ahead. Having an open dialogue with suppliers can make the difference. It's important to understand how optimization and automation affect production and purchasing decisions. For example, can existing industrial robotics actually accomplish what you are asking suppliers to do? Or is your business going to have to redesign products to meet today's realities? These questions will influence how your supply chain partners stay ahead of a changing field.

CREATING INDUSTRY-SPECIFIC RESPONSES

Depending on the sector and how quickly it is moving toward industrialization and automation, this shift will affect businesses in different ways. For organizations not feeling a direct impact from policy, industrialization, or automation, there are still practices that can be implemented today to capitalize on a changing landscape:

- » **Consider educational partnerships.** A recent report on skills gaps in Asia by Hays Recruiting recommends that governments and businesses in China “ensure better training for employees and closer collaboration with schools, universities, and technical colleges to deliver the skills pipeline of the future.”⁷³
- » **Engage in community-relations programs.** These can help promote transparency, stakeholder engagement, and open dialogue, all which mitigating potential damage caused by a loss of jobs due to industrial upgrading.
- » **Prepare your workforce for potential future disruptions.**⁷⁴ For instance, the Suzhou-based semiconductor company Good Ark has integrated a culture of responsibility and inclusion that promotes cross-functional rotation to build professional resilience and transitional assistance for those seeking other jobs. This allowed the organization to go through layoffs resulting from management role changes, without affecting product quality, safety standards, or company culture.

Supporting Your Workers

Businesses also can invest in and support worker inclusion in a changing economy. When management and human resources personnel collaborate, the benefit can be felt today through more capable, engaged workers. It also paves the way for the workforce of tomorrow. Organizations can codify these practices into internal systems of skills upgrading and reimagining mobility.

SKILLS UPGRADING

Although the Chinese government is investing in talent upgrades for its workforce, these industry changes will affect millions of workers, making it impossible for government to reach all people. The private sector can play a part by building learning and development support mechanisms that prepare workers for the jobs of the future.

The Institute for the Future lists 11 skills likely to be in demand over the next decade. These include personal skills like resilience, people skills, and the ability to work in diverse teams, as well as computational skills and foresight. According to the Institute for the Future, “because insight, creativity, and adaptability are not easily automated skills, workers of the future will need to cultivate these traits to be successful in an increasingly mechanized environment.”⁷⁵

Business can use technology to upskill workers’ talent for the future:

⁷³ Wilson, 2016.

⁷⁴ Sucher et al., 2016.

⁷⁵ Institute for the Future, 2016.

» **First, use technology to make training mobile.** Chinese smartphone owners check their phones every six minutes. They also spend up to five hours per day online.⁷⁶ Global studies show 80 percent of employees now turn to their mobile devices for continuing education.⁷⁷ Capitalize on that captive audience by developing mobile training applications specific to your workplace. BSR's HERproject, a collaborative initiative that strives to empower low-income women working in global supply chains, provides mobile-ready content to workers. This allows for on-demand learning to supplement a peer-education approach.

» **Second, ensure training is accessible** for all workers. Remember digital penetration rates in China vary by province. This means not every worker is going to have access to smartphone technology or the internet. For populations without such access, developing “low-tech” options of engagement may prove useful. The International Labour Organization's C-BED program develops low-cost, replicable, open-source books to deliver information to rural areas of the developing world. These types of programs begin to address both skills and digital penetration gaps.

» **Third, remember your audience.** Training should be easy to digest, with language that is simple for workers to understand. Training programs also should be short. The human attention span has fallen by 4 seconds since 2000, making us less attentive than goldfish.⁷⁸ To hold workers' interest, provide content that is relevant, interactive, and easy to share.

» **Lastly, make it meaningful.** Training topics should position workers for success in a changing workplace. This will vary by industry, labor force, and location. Use the unique capabilities of your business through mentorship opportunities, interactions with the community or government, or the incorporation of training into existing team-building activities.

REIMAGINING MOBILITY

Good jobs allow employees to develop skills and advance themselves at work. Traditional mobility takes a measured approach, step by step, as employees climb the proverbial corporate ladder. In this era of great change, it is time to reimagine mobility. As Curtis Carlson, former CEO of SRI International notes, “Everyone, right now, is wide open to revolutionary transformational developments. The only limitation we have is our ability to exploit them.”⁷⁹

⁷⁶ eMarketer, 2015.

⁷⁷ Foundry, 2016.

⁷⁸ Gallagher, 2015.

⁷⁹ Ibid. McKinsey Global Institute, 2014.

Workplace Skills of the Future

PERSONAL SKILLS

- Resilience

PEOPLE SKILLS

- Cross-cultural competency
- Social intelligence
- Virtual collaboration

APPLIED KNOWLEDGE

- Novel and adaptive thinking
- Cognitive load management
- Sense-making

WORKPLACE SKILLS

- New media literacy
- Design mindset
- Transdisciplinarity
- Computational thinking

Source: Institute for the Future

Upskilling prepares the labor force for the jobs of tomorrow. Reimagined mobility will help reposition existing talent for success in the workplace of tomorrow. It identifies top talent for new types of roles outside their current scope, engages the unengaged, and considers the long-term return on investment for an employee. This view of mobility ensures a painless transition for workers who are replaced due to automation, policy, or optimization. It is also not limited within any one company, but between companies, industries, and skill sets.

Here are some steps companies can take to reimagine mobility:

- » **Foster top talent.** Identifying and fostering top talent is not a new concept. Yet in the rush to advance, managers may forget that the line worker of today could be the CEO of tomorrow. BSR's Women in Factories Program, a collaboration with the Walmart Foundation, works with China-based factories to identify top talent and nurture their abilities. Through a structured curriculum centered on communication, financial, and managerial skills, we are working to train the next generation.
- » **Consider long-term investment.** In the reimagined world of mobility, your workforce brings talent and innovation to your business—and to the wider world. Businesses already make long-term investments in employees by providing training courses and skills development. Companies can take this further by promoting and funding external employee ventures. Workforce changes due to automation make such investments especially timely. Job automation will result in lost jobs, but it will also create different types of economic opportunities, workplaces, and needs for talent. Leading businesses are already positioning employees to capture these benefits, even if their workforce may not be around to return the investment.



IN FOCUS

From Rags to Riches

In 2015, a former factory worker from Shenzhen became China's richest woman. Zhou Qunfei is the CEO of Lens Technologies, which makes the glass pads for smartphone devices. Financial circumstances forced her to drop out of school at 16, when she became a line worker in one of China's many factories. Today, she has an estimated worth of more than US\$7.6 billion and oversees 80,000 employees.

Her secret is something businesses can replicate to get the most out of their workers. Zhou fully understands her business, says yes to opportunity, and works incredibly hard. Do workers in your labor force possess these qualities? Perhaps they are reticent to put their hand up for a promotion? Consider preparing them for more advanced operational functions. Instead of just upskilling, enter them into manager-training programs or provide mentorship opportunities.

Source: Bill Murphy Jr., "How a Former Factory Worker Built a \$7 Billion Fortune," Inc., accessed November 2016, <http://www.inc.com/bill-murphy-jr/how-a-16-year-old-dropout-built-a-7-billion-fortune.html>.

- » **Build a bridge.** There is no doubt changes to Chinese industry will result in job loss, and business has a role to play in ensuring a smooth transition for workers. Finding roles for millions of Chinese workers is not realistic. Many will have to reconsider their future. Some workers will return to their home villages. Others may take up agriculture or find odd jobs. What opportunities exist for those who stay in China's cities? How can your business start to think about workforce transitions early to minimize the impact on individual workers?

IN FOCUS

Nokia Helps Employees Build a Bridge

Finnish technology firm Nokia understands how redundancies can affect the workplace. Nokia divested its mobile business line in 2012, resulting in 18,000 layoffs between 2011 and 2013. To help redundant employees, the company developed its Bridge Scheme program, which provided five paths toward a next step in employment: finding a new job within Nokia, finding a job outside the company, starting a new business, learning a new skill, or creating one's own future path.

Nokia offered both financial and in-kind support for all paths to ensure a smooth transition and minimize days without work. The company's biggest investment went to employees starting a new business. For successful pitches, Nokia provided seed funding of \$26,700 per employee. The pitches ranged from technological to agricultural, with winners selected based on concept quality and economic factors in each market. Through this program, the company helped close to 1,000 start-up ventures in 13 countries.

Before they left Nokia, 60 percent of employees were able to find jobs. The company provided support afterward for those who were still seeking employment.

Participants gave the Bridge Scheme an 85 percent satisfaction rate.

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Conclusion

Business can and should play an active part in shaping the changes happening across China. These changes, both top-down policy positions from the government and bottom-up shifts in labor trends, spell opportunity for companies that take advantage of them. Supply-side reforms, the onslaught of automation, and moves towards domestic independence will impact all industries over the long term. For this reason, our recommendations around supporting supply chains and workers resonate throughout the world of business in China.

This era, now the fourth major shift for contemporary Chinese industry, will result in as much disruption as those before. Outmoded models of operation, particularly among bureaucratic state-owned enterprises, will be replaced with modern methods of production. Resource consuming industries, like coal and heavy manufacturing, will see optimization of supply chains to reduce overuse of finite materials. Businesses that once provided jobs, tax revenue, and infrastructure to local communities will lose their social right to operate as robots replace workers.

To stay competitive, businesses must understand, prepare, and adapt to this changing environment.

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