China Insights

Qunhui Huang

Understanding China's Manufacturing Industry

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Series Foreword

Since the Opium War, modern China has come under attack and been bullied for its backwardness; this cultural circumstance has given many Chinese people a psychological inferiority complex, as China has lagged behind other countries technologically, institutionally, and culturally. Efforts to change the situation in which Western countries were strong but China was weak and to revitalize China needed to start with cultural criticism and culture renovation. Therefore, the Chinese people turned their eyes to the outside world and learned from Japan, Europe, the USA, and even Soviet Russia. We have always been overwhelmed by stress and anxiety and have had a burning desire to reverse the state of being bullied as a result of underdevelopment, poverty, and weakness and to catch up with and surpass the Western powers. In pursuing the more than one-hundred-year-old dream of building a powerful country and reviving China, we have focused on understanding and learning from others, but seldom, if ever, have others learned from and understood us. This has not greatly changed in the course of modernization since China's reform and opening up in 1978. The translation and introduction of many Western works in the 1980 and 1990s is a very good example. This is the history of the Chinese people's understanding of the relationship between China and the rest of the world since the beginning of modern times.

At the same time, in pursuing the dream of turning China into a powerful country and rejuvenating it through material (technological) criticism, institutional criticism, and cultural criticism, the Chinese people have struggled to find a path that would make the country prosperous and the people strong while preventing the country from being ruined and the race from being destroyed. This path first represents a thought, a banner, and a soul. The key issue has been what kind of thought, banner, and soul can save the country, making it prosperous and the people strong. For more than one hundred years, the Chinese people have constantly carried out experiments and attempts amidst humiliation, failure, and anxiety. They have experienced failure in adopting advanced Western technology and thought on the basis of safeguarding China's feudal system and practicing a constitutional monarchy after the collapse of the Western capitalist political path and a great setback in worldwide socialism in the early 1990s. The Chinese people ultimately embarked on a path toward a successful

revolution with national independence and liberation; in particular, they have adopted a path leading to the socialist modernization of China—a road toward socialism with Chinese characteristics—by combining the theoretical logic of scientific socialism with the historical logic of China's social development. After more than 30 years of reform and opening up, China's socialist market economy has rapidly developed; tremendous achievements have been made in economic, political, cultural, and social constructions; comprehensive national strength, cultural soft power, and international influence have substantially improved; and a great success has been achieved in socialism with Chinese characteristics. Although the latter project has not yet become full fledged, its systems and institutions have basically taken shape. After more than one hundred years of pursuing dreams, China is rising among the nations of the world with a greater degree of confidence in the path it has chosen, the theory it has adopted, and the institutions it has created.

Meanwhile, we should be aware that given the long-standing cognition and cultural psychology of learning from Western countries; we seldom take the initiative in showcasing ourselves—historical China and current China in reality—to the world, though China has emerged as a great world power. Due to a deeply rooted view that "Western countries are strong and China is weak," developed through Western-Chinese cultural exchanges, Western people and nations seldom have a sense of Chinese history or the current developments in China, let alone an understanding of China's developmental path and such in-depth issues as the scientificity and effectiveness of China's theory and institutions or their unique value for and contributions to human civilization. As self-recognition is not displayed, the "China Collapse Theory," "China Threat Theory," "China State Capitalism," and other so-called theories coined by certain people with ulterior motives and differing political views have been widely spread.

During our development, based on "crossing the river by feeling the stones," we have paid attention to learning from Western countries, understanding the world and learning to know ourselves through Western experience and discourse but have neglected self-recognition and efforts to let others know us. When we strive to become part of the world in a more tolerant and friendly way, we are not objectively, truly understood. Therefore, we should describe the path to the success of socialism with Chinese characteristics, tell Chinese stories, disseminate Chinese experiences, use international expressions to show a real China to the world, and help people around the world realize that the Western manner of modernization is not the endpoint of human historical evolution and that socialism with Chinese characteristics is also a valuable treasure of human thought. This is undoubtedly a very important task for an academic cultural researcher with a sense of justice and responsibility.

In this connection, the Chinese Academy of Social Sciences organized its top-notch experts and scholars and several external experts to write the China Insights series. This series not only provides an overview of China's path, theories, and institutions but also objectively describes China's current development in the areas of political institutions, human rights, the rule of law, the economic system, finance,

social governance, social security, population policies, values, religious faith, ethnic policies, rural issues, urbanization, industrialization, ecology, ancient civilization, literature, art, etc., thus depicting China in a way that helps readers visualize these topics.

We hope that this series will help domestic readers more correctly understand the course of the more than 100 years of China's modernization and more rationally look at current difficulties, enhance the urgency for and national confidence in comprehensively intensifying reform, build a consensus on reform and development, and gather strength in this regard, as well as deepen foreign readers' understanding of China, thus fostering a better international environment for China's development.

Beijing, China Jianying Zhao
January 2014

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Chapter 1
Rise of Manufacturing Nation

Abstract The essence of China's economic rise since the reform and opening-up is the successful and fast promotion of industrialization process. With this rapid process, China's manufacturing industry grows stronger and stronger, and "Made in China" can be seen everywhere in the world. China has now stepped into the advanced stage of industrialization, and since 2010 it has become the largest manufacturing country in the world. However, "Big but Not Strong" has been the basic economic situation of the nation. China's manufacturing industry is now confronted with a series of new problems and new challenges, for example, structural overcapacity, industries in urgent need of transformation and upgrading, and challenges of new industrial revolution. The Sino-US trade friction has targeted specifically China's manufacturing industry and "Made in China 2025" strategy. Under such circumstances, how to treat China's manufacturing at this stage of industrialization and the future of China's manufacturing will be an important issue of global significance.

Keywords The Sino-US trade friction · Made in China · Big but Not Strong

1.1 Starting from the Sino-US Trade Friction

The US provoked the Sino-US trade friction at the beginning of 2018. On April 4, the American government released the product list with additional tariffs and a plan to impose additional tariffs of 25% on 1333 Chinese products worth US$ 50 billion. On May 5, US President Donald Trump required the office of the US Trade Representative (USTR) to lay on additional tariffs on Chinese products worth US$ 100 billion, based on the Sect. 301 Investigation Report China. The US Commerce Department announced, on April 16, that the American corporations would be forbidden to sell spare parts, commodities, software, and technologies to Zhongxing Telecommunications Equipment (ZTE) Corporation for about seven years until March 13, 2025. The reason given was that ZTE was accused of having violated the US terms of sanctions against Iran demanding that companies should restrict selling American technologies to Iran. On June 15, the US announced the list of products that the US would impose a tariff hike of 25% on Chinese products worth US$ 50 billion. Among these products, the US would levy tariff measures on products worth about

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US$ 34 billion since July 6, 2018, and, at the same time, would start to seek public opinion on imposing tariffs on products worth US$ 16 billion. The US started the tariff spike on Chinese products worth US$ 34 billion on July 6, 2018. On August 7, the office of the USTR announced that the tariff spike of 25% on Chinese products worth $16 billion would be implemented on August 23. On September 18, 2018, Trump instructed the office of the USTR to impose additional tariffs on Chinese products worth about US$ 200 billion, which would come into effect on September 24, 2018, with 10% of tariff increase before the end of 2018 and up to 25% of tariff hike from January 1, 2019. Meanwhile, Trump also claimed that US would impose a tariff hike on other Chinese products worth about US$ 267 billion if the Chinese government took retaliatory actions against American farmers and other industries. In this period, Chinese government also took countermeasures against US. China would impose a tariff hike of 25% on 545 American products worth about US$ 34 billion on July 6, 2018, in which the category of automobile involves 28 products. On August 8, 2018, the Customs Tariff Commission of the State Department decided to impose a tariff hike of 25% on American products worth about US$ 16 billion since August 23, 2018.

In the US Sect. 301 Investigation Report on China, there exist many false judgments on and groundless accusations concerning China's technology innovation and the development of manufacturing industry. For example, the US accused Chinese government of requiring American corporations to establish joint ventures and transfer technology, of foreign investors' confrontation with ownership restrictions on many Chinese core industries, of investing extensively and systematically in American corporations and properties with the aim to get access to advanced technology, of the mandatory provisions that products used in Chinese information networks should be developed and produced by Chinese corporations or those corporations controlled by China, etc. The Sect. 301 Investigation Report on China (hereinafter referred to as the Report) released by the USTR claims that the USTR firmly believes that the laws, policies, and practices of Chinese government concerning technology transfer, intellectual property rights, and innovation are unreasonable or discriminatory, backed up by a large number of cases. Based on this, the American government stirred the Sino-US trade friction. The Report declares a contrast between some of China's current systems and practices and the international code of practices, claiming an objective point of view, while including many subjective assumptions and misconceptions, with its argumentation full of logical confusion. It is based on this Report that the US incited the trade friction. It is really the case that "He who has a mind to beat his dog will easily find his stick". With regard to the accusation of technology transfer in China's manufacturing industry, errors were found in the Report from at least three aspects.

First, the argumentation process is logically misleading. According to the Report, China takes full advantage of restrictions of the shareholding ratio of foreign ownership and the approval procedures to force or compel American corporations to transfer technology. And the materials employed to support this argument are mainly cases of some industries and some surveys by the Chamber of Commerce. In fact, the

conclusion based on the supporting evidence in the Report that China forces American corporations to transfer technology is overgeneralized, unconvincing, fabricated, and exaggerated, and thus logically misleading. For example, the Report attacks the "Catalogue for the Guidance of Foreign Investment Industries in China" (revised in 2017) by saying "Foreign investors are still confronted with ownership restriction in many core industries", and "35 industries are restrictive with ownership restrictions or requirement for local cooperation". But the Report does not also point out that, in fact, the category lists up to 348 industries encouraging cooperation, that the restricted and excluded industries are basically those related to national security, and that the US has also taken measures to restrict foreign investors for the sake of national security. For another example, some general surveys provided by the Report basically come from American Chamber of Commerce, and the survey results shows only a subjective index of worries about being forced to transfer technology (35% of the corporations surveyed worry that the requirement of practical technology transfer would be a condition for market access). The survey did not provide objective data and practical cases of corporations forced to transfer technology, and therefore cannot serve as direct evidence for the relevance of "business license approval and restrictions on shareholding ratio of foreign companies" and "forced technology transfer". According to the surveys of the American Chamber of Commerce, the Report presumes that "restrictions on shareholding ratio and business license approval" aims at "forced technology transfer". This presumption is very unconvincing. For example, according to the report of the American Chamber of Commerce, the Report groundlessly accuses "Made in China 2025" strategy of regarding technology transfer to Chinese partners as a market access condition. But in reality, "Made in China 2025" strategy emphasizes and encourages the improvement of the level of foreign capital utilization and international cooperation. In another example, the Report overemphasizes the intention of Chinese government to force technology transfer by exaggerating the importance of technology transfer for improving the innovation capacity of local companies. The Report specifically lists the case of Changan Model—China Changan Automobile Group (CCAG) is said to have achieved control over the core production technology after acquiring the technology of the joint venture partner by means of a government-mandated joint venture. However, the Report neglects the fact that the CCAG has been cultivating the capacity for independent innovation by substantially increasing research and development investment. In fact, the CCAG serves as a model of technology innovation, after making itself acquainted with new technology, testing and adapting it. Yet this type of technology transfer is a completely voluntary act, based on the need to implement a development strategy for all parties. Countries such as Germany, Japan, and South Korea etc. all encourage such an approach to technology innovation. In terms of the great majority of the automobile joint ventures in China, multinational corporations of developed countries still maintain the initiative because of mastering core technology, even though they do not absolutely in control. The contribution of multinational corporations to technology upgrades of China's national automobile enterprises is not immediately apparent, and, to a certain degree, there is a problem that Chinese enterprises cannot acquire needed technology even at the cost of losing market.

Second, there exists a serious misunderstanding of the role of state-owned enterprises. The cases listed in the Report identify the state-owned enterprise behavior with government action. For example, if state-owned enterprises acquire advanced technology from a joint venture partner or foreign corporations, this is taken as a government act. However, a thorough reform of China's state-owned enterprises has been implemented starting 40 years ago, and the current situation of state-owned enterprises is very diversified. According to the documentation requirements of the Third Plenary Session of the 18th Central Committee of the CPC, China's state-owned enterprises have started to implement new relevant reforms and governance methods since 2013. Even though there are some public policy enterprises under the influence of the government, the number of these enterprises is very small. The great majority of the state-owned enterprises have already transformed into commercial enterprises with a modern diversified property structure and a market-oriented management system—the New State-owned Enterprises. These New State-owned Enterprises and private enterprises both seek to maximize profit, and their technology acquisition strategy and internationalization strategy are part of their enterprise culture. The Report notes that, among the 1395 cases of Chinese enterprises' investment and acquisition in the US from 2000 to 2016, 351 cases were undertaken by China's state-owned enterprises, accounting for about 25%, but does not say what type of state-owned enterprises had implemented the investment and acquisition strategy in these 351 cases. China's state-owned enterprises are increasingly diversified. Under the circumstances, it is undoubtedly a clear logical fallacy if this is used to prove that cases of government-guided acquisitions account for a significant proportion of the total. Based on these evidences, the Report further reaches the conclusion that the Chinese government provided plentiful funds to invest extensively and systematically in American enterprises and assets in order to acquire advanced technologies. This conclusion is undoubtedly wrong. Foreign investment of Chinese enterprises is typical market-oriented behavior. Upgrading Chinese industry and intensifying market competition, Chinese enterprises have to improve their own technological standard. This is in line with internationally accepted practices to gain access to technology by means of acquisition. The doctrine of international economics has accepted that there exist the so-called "technology seeking-oriented" transnational mergers and acquisitions in transnational investment. The development of Chinese enterprises enables them to implement the "Going Global" strategy by means of building research and development centers abroad or making overseas acquisitions and technology-based mergers and acquisitions. Even if there are individual cases of mergers and acquisitions above the market clearing price, these cases represent in general the normal enterprise behaviors based on win–win cooperation in the context of globalization. It is therefore completely irrational to misinterpret them as procuring intellectual property rights through government intervention.

Third, there are prejudiced assumptions in the Report when discussing industrial policy goals. Needless to say, as a developing nation, China has always attached great importance to the implementation of industrial policy and the promotion of economic development. And China has developed from a poor and backward country into an industrial power with the total economic output ranking No. 2 in the world,

in which industrial policy plays a vital role. In 1990s, China started to promulgate the "Catalogue for the Guidance of Foreign Direct Investment Industries in China" for the purpose of appropriately protecting local industry and maintaining national economic security. After entering the World Trade Organization (WTO), China has actively managed to be in line with international practices. In most of Chinese industries, equal treatment of domestic and foreign enterprises has already been achieved in market access. The few industries with restrictions on the shareholding ratio of foreign capital exist only with the purpose to ensure national security and to protect traditional culture, rather than to acquire technology, which is the biased assumption in the Report, targeting such industrial policies as the "Catalogue for the Guidance of Foreign Direct Investment Industries in China". Likewise, the Report also contains many misinterpretations and groundless speculations "Made in China 2025" strategy. "Made in China 2025" strategy is actually an industry program, which responds to the new round scientific and technological innovation and industry transformation, takes the promotion of the innovation and development of China's manufacturing industry as its theme, centers on improving quality and efficiency, regards accelerating the speed of the integration of the next-generation information technology and manufacturing industry as its main task, and gives priority to promoting intelligent manufacturing. In essence, the main direction of "Made in China 2025" strategy is "intelligent manufacturing", not different from the main direction in the American "Advanced Manufacturing Partnership" (AMP) the "Industrial Internet", and the main direction in Germany's "Industry 4.0" the "Cyber-Physical System" (CPS). What's more, the objectives of market share and autonomy rate mentioned in "Made in China 2025 Technology Roadmap", compiled by academic experts, are only a predictive and information-guided index rather than a policy objective set by the government, and are therefore not compulsory and not linked to related government policies and capital investments. This is only government counsel under the market-oriented principle, which is not uncommon abroad. The Report claims "Made in China 2025" imposes restrictions on the market operation of foreign enterprises, or considers technology transfer as the market access condition; but this claim is unfounded. It should be noted that, after entering WTO in 2001, China follows unconditionally the WTO "Agreement on Subsidies and Countervailing Measures" (ASCM) and "Trade-Related Investment Measures" (TRIM). China has been taking major steps to achieve the transformation of its industry policy since then, preferring to rely on competition to promote China's economic development. China's "Anti-unfair Competition Law" and "Anti-Monopoly Law" have been playing an increasingly important role in preventing misconducts that impair fair competition, establishing a fair market order, and protecting the legitimate rights and interests of consumers and enterprises. The Report accuses China of using the "Anti-Monopoly Law" as an industry policy tool rather than a tool for protecting competition, and of discriminatory law enforcement to foreign enterprise. This accusation comes, however, without any real evidence.

The problem of the misleading misinterpretations and the prejudiced assumptions of the US Sect. 301 Investigation Report on China did not occur by accident. In the pattern of global division of labor in manufacturing industry, China has gradually

accelerated the upgrading of its manufacturing industry after entering the WTO, and the industrial structure gradually transformed from labor-intensive industries to capital and technology-intensive ones. China's industry and product structure shows an increasingly higher overlap with US, and the competition between the two countries is becoming increasingly fierce on the industry and technical level. In fact, faced with competitive pressure from the rise of China, some of the American think tanks did not enquire the true reason instead attributing the problems to China's "unregulated competition", and fabricating a concept of "innovation mercantilism". This concept lists China as an "innovation mercantilism country" and unreasonably accuses China of violating the WTO spirit and its rules by adopting an economic development strategy of reducing imports and expanding exports of high value-added products.[1] In a sense, the US Sect. 301 Investigation Report on China has been the official version of recent wrong thinktank trends of thought.

In essence, the root cause of the US trade investigation into China and the Sino-US trade friction is that the US government is afraid of the rapid development of China's economy. On the surface, the US Sect. 301 Investigation Report on China is targeted on the trade deficit, but the key word is "technology", and the core goal is to safeguard American interests in high-tech areas and to contain China's transformation to manufacturing power. From another perspective, this just shows that China's manufacturing industry has made great achievements since the reform and opening-up. China's economic aggregate ranked second in the world in 2010, and in 2017 surpassed US economic aggregate by 60%, becoming the largest manufacturing nation in the world. Manufacturing industry is the instrument for rejuvenating China, the policy for strengthening China, and the foundation for building China. With the rise of the manufacturing nation of China, the attempt to contain China's transformation from a manufacturing nation to a manufacturing power is the strategic starting point of the Sino-US trade friction provoked by UK.

1.2 China's Industrial Revolution

Qin Shi Huang, the first emperor of Qin dynasty, unified the six states in 221 BC, and established a unified feudal autocratic country. Before the rise of the western industrial civilization, China had gone through many vicissitudes and dynasties, and had always been one of the few major nations where ancient civilizations have advanced the productive forces in the world. However, after 1800, the industrial revolution, which began in Britain and gradually spread to Germany, the U.S. and other countries worldwide, ended the traditional agricultural culture that had lasted for thousands of years and opened up the modern industrial civilization of the past 200 years. And China, the ancient feudal power, missed the opportunity of the modern industrial revolution and was therefore left far behind the modernization process.

[1] [United States] Atkinson and Ezell [1], pp. 220–238.

It was only after the foundation of the People's Republic of China that China began its own industrialization process and then laid a first foundation of industrialization. However, the industrial development of the People's Republic of China was not smooth sailing, and the industrialization process was interrupted several times. From 1958 to 1961, China suffered heavy losses due to the Great Leap Forward, and China's industrial system was greatly damaged during the decade of the Cultural Revolution. While on the whole, in 1978, China had no more than a frail basis for the modern large-scale industrial system, in general it still remained in the primary stage of industrialization, and the overall level of economic development was very backward.

Since the implementation of the reform and opening-up policy, China has embarked on the great endeavor to build a great modern socialist system with Chinese characteristics. The past four decades of the Reform and Opening-up have brought about tremendous and revolutionary changes. As Table 1.1 shows, in the 40 years of the Reform and Opening-up, the output of the major industries in China has increased by hundreds or thousands of times, and most of the products are now globally leading in quality. For example, raw coal, cement, crude steel, steel and power generation

Table 1.1 Changes in the output of major industrial products in China over the past 40 years of the reform and opening-up (1978 and 2017)

Products	1978	2017	Index (Ratio of output in 2017 to that in 1978)	World's Rank
Raw coal (One hundred million tons)	6.2	35.2	567.7	1
Crude oil (Ten thousand tons)	10,405.0	19,150.6	184.1	4
Natural gas (One hundred million m^3)	137.3	1480.3	1078.2	—
Cement (Ten thousand tons)	6524.0	234,000.0	3586.8	1
Crude steel (Ten thousand tons)	3178.0	83,172.8	2617.1	1
Steel (Ten thousand tons)	2208.0	104,958.8	4753.6	1
Automobiles (Ten thousand)	14.9	2901.8	19,469.8	—
Metal cutting machine (Ten thousand)	18.3	67.3	367.2	—
Generating capacity (One hundred million kilowatt)	2566.0	64,951.4	2531.2	1

Note The data of metal cutting machine is the data of 2016, and the world's rank is the data of 2015
Data source National Bureau of Statistics: *China Statistical Yearbook (2017)*, China Statistics Press, 2017 edition, p. 6; National Bureau of Statistics [5]; International Department of National Bureau of Statistics [6]

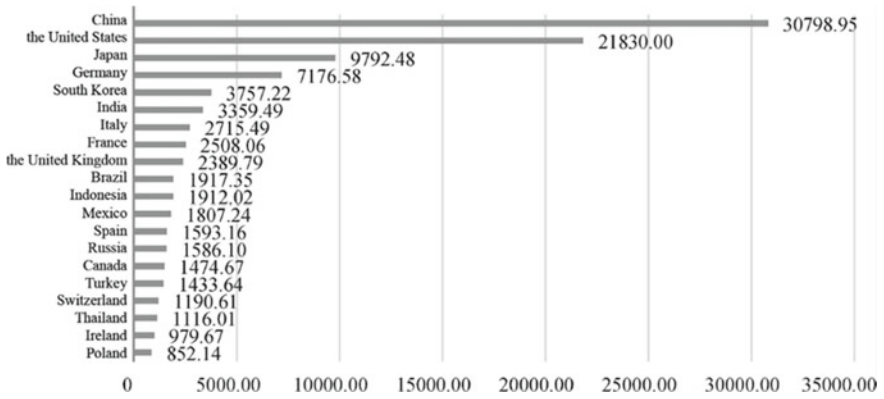

Fig. 1.1 The added value of manufacturing industry in major countries in the World in 2016 (US$ 100 million) *Data source* United Nations Statistics Division database

capacity all rank first in the world; therefore, China is truly the largest industrial power in the world.

Manufacturing industry is the main part and core of industry, and China's status as an industrial nation is mainly supported by the continuous development of the manufacturing industry.[2] "Made in China" can be seen in more than 230 countries and regions in the world. China has become the world's largest manufacturing nation in terms of output since 2010. In the United Nations (UN) industrial catalogue, China is the only country with a manufacturing capacity covering all industrial sectors. Nowadays, China ranks first in the world in the output of more than 220 out of 500 major industrial products.[3] As shown in Fig. 1.1, according to the UN statistics division database, by 2016, the added value of China's manufacturing industry reached US$ 3079.895 billion, accounting for 24.5% of the global total, which is nearly a trillion dollars more than the US with manufacturing added value of US$ 2183 billion, and which is almost the sum of that of the US and Japan, ranking second and third in the world respectively. In 1984, the proportion of the US' manufacturing added value reached 29% in the world, after ups and downs, and only 17.3% of the global manufacturing industry in 2016. The proportion of Japan's manufacturing added value peaked at 21.5% in 1990s, but decreased to just 7.7% in 2016. In fact, it is owing to the rapid development of China's manufacturing industry that the pattern of the global manufacturing industry has undergone tremendous changes. In general, although the manufacturing added value of high-income countries still account for about 60% in the world, this proportion has been continuously declining over the

[2] The subject of this book is manufacturing industry; however, due to the relatively poor availability of China's manufacturing data, industrial data is sometimes used to explain manufacturing issues, which is a relatively large caliber. The general empirical data is that the added value of China's manufacturing industry is about 90% of that of the industry. When discussing later in this book, I will not explain them one by one.

[3] Jigang [2].

recent 20 years, which is largely related to Asia, especially China. The proportion of China's manufacturing added value in the world increased from very little in 1970 to a quarter of the world in 2016.[4]

Thanks to the economic development over the past 40 years of reform and opening-up, China has rapidly grown into the world's largest industrial country and the manufacturing nation. This is the industrialization process of a country with a population of more than 1.3 billion. This has been a process of rapid development with the industrial average growth exceeding double digits lasting for four decades, which is unprecedented in human history. If we say ancient China missed the industrial revolution 200 years ago, the 40 years of reform and opening-up is then the great industrial revolution that China started at the end of the twentieth century.[5]

1.3 "Big but Not Strong" and "Squeeze from Both Sides"

While recognizing the great achievements of China's industrial revolution in the past 40 years of reform and opening-up, we must realize the basic economic conditions of China's manufacturing industry, which is "big but not strong", and we must be aware that the problem of unbalanced and inadequate development of the manufacturing industry remains very serious.

First, the development of the industrial structure of manufacturing industry is lopsided, and the development of its upgrading is insufficient. As for China's manufacturing industry, the problem of overcapacity in low-level products such as steel, petrochemical, building materials and other industries is prominent and long-standing, and reducing overcapacity has become one of the main targets of "supply-side structural reform". In the manufacturing industry, the segment of traditional resource processing and capital-intensive industries is still relatively high, while the proportion of high-tech manufacturing is comparatively low. In recent years, the growth rate of high-tech industries in China's manufacturing industry is much higher than that of the overall industry, but by 2017, the added value of the six major high-tech manufacturing industries, including pharmaceutical industry, manufacturing of aviation, spacecraft and related equipment, electronics and communication equipment manufacturing, computer and office equipment manufacturing, medical equipment and instrument and apparatus manufacturing, and information chemicals manufacturing, accounts for only 12.7% of the added value of industries above the designated size, far lower than the proportion of the six high energy-consuming industries in the added value of industries above the designated size. In terms of industrial technology capability in China, the capacity of the "four bases of industry" still needs to be increased. Traditional manufacturing industries rely heavily on imports and foreign enterprises for the key equipment, core components and basic software. Some core technologies are still in need of a break-through, and

[4] Hallward-Driemeier and Nayar [3].

[5] Wen [4], p. 7.

some cutting-edge technologies with global competitiveness in emerging industries are inadequate. High-end computerized numerical controlled (CNC) machine tools, integrated circuits, high-end chips, precision testing instruments and other high-end products rely on imports. The "ZTE Incident" in April 2018, as part of the Sino-US Trade Friction provoked by the US, fully illustrates this point.

Second, the development of the organizational structure of the manufacturing industry is uneven, and the rationalization of the industrial organization is not fully achieved. There exists a considerable number of "zombie enterprises", and the number of high-quality enterprises, especially the world-class manufacturing enterprises, is not enough. In terms of asset size, sales revenue and other indicators, a number of large enterprise groups have emerged in China. According to the "2017 Global Fortune 500" list released by the American magazine, *Fortune*, the number of Chinese enterprises on the list has reached 115, ranking second only next to the US. However, in China's manufacturing enterprises, there are only few ranking top, and the scale indicators are likely to take priority with obvious weaknesses and deficiencies in innovation capacity, branding, business model, and the degree of internationalization. From the indicators such as return on assets, corporate profits and per capita profit, there is still a significant gap between China's manufacturing companies on the list and European and American companies listed in the Fortune 500 companies. China still lacks real world-class enterprises. Besides, many "zombie enterprises" have emerged in recent years, whose operating conditions continue to deteriorate, and they are no longer self-sustaining. However, due to various reasons, these "zombie enterprises" cannot be easily removed from the market, mainly relying on government subsidies, bank loans, capital market financing or borrowing to keep their operations afloat.

Third, the development of product structure in the manufacturing industry is unbalanced, and the supply of high-quality, personalized, complex and high-value-added products is insufficient. Generally speaking, in China, the quality of manufacturing products is lower, the standard level and reliability is not high, and the creation of high-end product brands is not sufficient. From 2013 to 2017, the pass rates for sample testing of domestic product quality conducted under national supervision were 88.9%, 92.3%, 91.1%, 91.6% and 91.5% respectively, which is still far behind that of more than 99% abroad. China's exports have ranked first in recall notification among the European Union (EU) and the US for many years. According to the list of the world's top 500 brands in 2016 released by the World Brand Lab, 36 brands from China are on the list, only accounting for 7.2%, while the United States has 227 brands on the list. In the 2016 "Top 100 Most Valuable Brands in the World" list released by Interbrand, a world-renowned brand consulting company, only two Chinese manufacturing brands were listed.

From the perspective of international competition, the future development of China's manufacturing industry is also facing the pattern of a "Squeeze from Both Sides". Since the industrial revolution has opened up machine production, we have seen the emergence of a new division of labor between manufactured goods on the one hand and agriculture and mining industries on the other hand, and an intra-industry division of each industry and each product sector, which has then developed into an

intra-product specialization of the same product with different value-added links of the value chain. Since the 1990s, due to the enhancement of the product modularization and the production process separability, and the improvement of transaction efficiency and the reduction of transaction cost brought about by information technology, transportation technology and other "space compression" technology, the intra-product specialization, based on different processes and links of the value chain, has experienced a tremendous development, and the global value-chain specialization has become a core form of international division of labor. From the perspective of labor division, the key to the transformation and development of the manufacturing industry in the late-coming countries is to solve the problem of how to climb from the low level of the global value chain to the middle and the high level. Since the Reform and Opening-up, China's manufacturing industry has seized the opportunities brought by globalization, actively integrated into the global labor division system, and gradually advanced the transformation from a self-sufficient closed economy to an open economy utilizing both domestic and foreign markets and resources. However, in the process of moving up the global value chain in the future, China will face the "Squeeze from Both Sides" pattern, with the high-ranking squeeze from developed countries and the low-ranking squeeze from emerging economies.

On the one hand, after the international financial crisis, developed countries have reflected on the problem caused by the "hollowing out" of the manufacturing industry, promoted the "reindustrialization" strategy one after another, and advanced the development strategies and plans for various manufacturing industries in which manufacturing information and manufacturing services are the core. For example, the United States put forward the National Strategic Plan for Advanced Manufacturing and Germany put forward Industry 4.0 in an attempt to firmly occupy the high-ranking manufacturing industry in the "Third Industrial Revolution" and create a high-pressure situation against China's manufacturing industry. At the same time, developed countries are accelerating the construction of a new global trade and investment order. Through an active promotion of TPP (Trans-Pacific Partnership) and TTIP (Transatlantic Trade and Investment Partnership), developed countries wanted to establish a comprehensive network of economic and trade liberalization beyond WTO norms. These programs, if adopted, would become significant impediments to the integration of China's manufacturing industry into the new trade and investment order, pose a threat to the export of Chinese products to TPP member countries, and impact China's comparative cost advantage in the global manufacturing competition system. Especially under the background of Sino-US Trade Friction, the US has increased tariffs on Chinese products, greatly raising the cost of manufacturing in China. More importantly, China will be under great pressure by the United States, when it imposes a technological blockade on China. Such a step would bring great changes to China's strategy of manufacturing technology innovation and the cultivation of innovation ecology in the future.

On the other hand, with the rapid rise of emerging economies, developing economies such as Association of Southeast Asian Nations (ASEAN) and India will replace China-made products with those produced at lower costs. Thailand's manufacturing productivity, for example, is about the same as China's, but per capita