Chapter 7 Global Manufacturing Landscape and Industy and Supply Chain Resilience

The development of the manufacturing industry has an important bearing on the world economy. Since World War II, the global manufacturing industry has undergone many transfers of locations to form a landscape where the global industry and supply chains center around the "three major manufacturing hubs" of China, Germany, and the United States. At present, the industry and supply chains of the global manufacturing industry are increasingly regionalized, localized, diversified, and digitized, due to factors, such as reverse globalization, intensified trade protectionism, the COVID-19 pandemic, and the Ukrainian crisis.

I. The Three Major Manufacturing Hubs

Since the Industrial Revolution in the 19th century, the center of the global manufacturing industry has been transferred from the United Kingdom and the United States to Japan and Germany, then to the "Four Little Dragons" in Asia, and then to China. Thus three major supply chain networks have taken shape, i.e. the North American supply chain with the United States at the core, the European supply chain with Germany at the core, and the Asian supply chain with China, Japan, and South Korea at the core.

1. The "three manufacturing hubs" have given way to Asian dominance in manufacturing

The most significant change in the global manufacturing industry in recent years is that the power and role of developing countries have grown enormously, while

the comparative advantage of developed countries has begun to diminish. This is embodied in the rising proportion of manufacturing value added (MVA) of East Asia and the Pacific region in the world's total, from 31.9% in 2007 to 46.5% in 2021, up 14.6 percentage points, while that of Europe and Central Asia dropped from 33.6% to 21.8%. The number for North America dropped from 21.4% in 2007 to 17.5% in 2014, and then rose to 18.4% in 2020 (See Fig. 7.1).

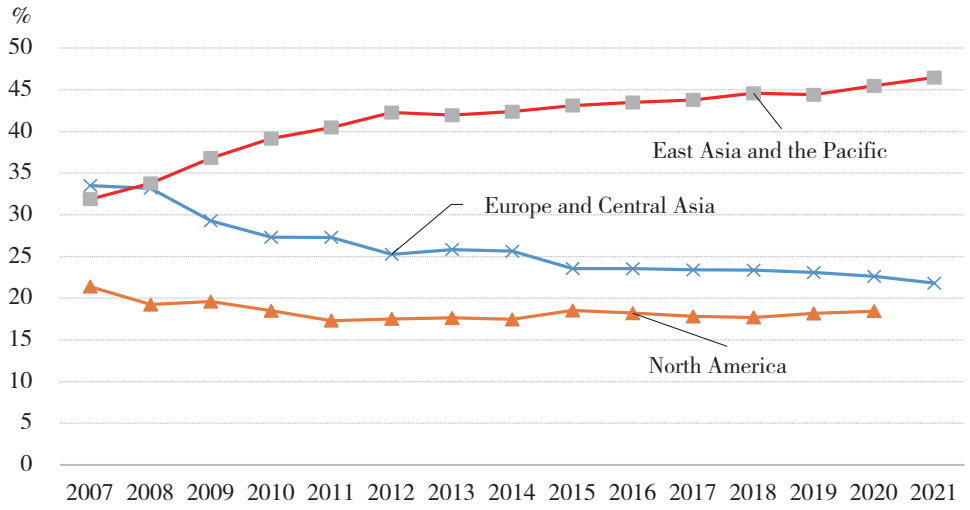

Fig. 7.1 MVA of major regions in the world's total, 2007-2021

Source: World Bank.

2. The "three manufacturing hubs" have their distinctive characteristics and advantages

The global manufacturing industry revolves around the United States, Germany, China, Japan, and South Korea, which have formed three hubs of industry and supply chains through cooperation with their neighboring countries (see Fig. 7.2).

One is the North American manufacturing hub, with the United States at the core, and Canada and Mexico at the perimeters. The United States, as one of the most developed industrial countries in the world, registered an MVA of $2.56 trillion, accounting for 11.1% of its GDP and 15.7% of the world's total MVA, ranking second in the world. Regional manufacturing clusters of steel, automobile, aviation, petroleum, computer, and chip, among other fields, have taken shape in the northeast, south, and Pacific coast of the United States. Besides, the United States has built close

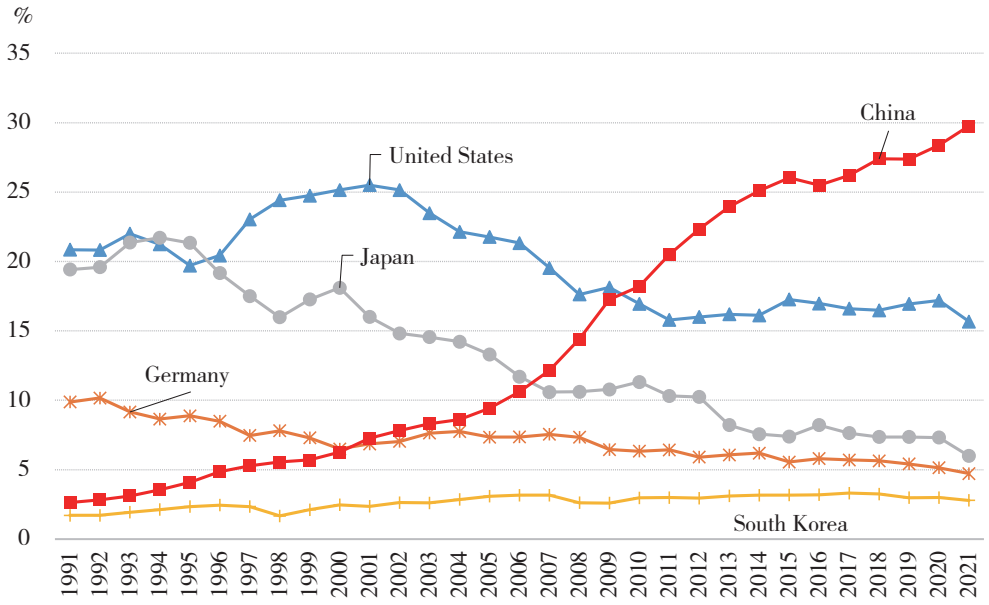

Fig. 7.2 MVA of the United States, Germany, China, Japan, and South Korea in the world's total, 1991-2021

Source: World Bank.

partnerships with Canada and Mexico in industry and supply chains. Statistics from the US Bureau of Economic Analysis show that the United States' imports of goods from Canada and Mexico account for about 1/4 of its total imports, and its exports to Canada and Mexico account for 1/3 of its total exports (see Fig. 7.3).

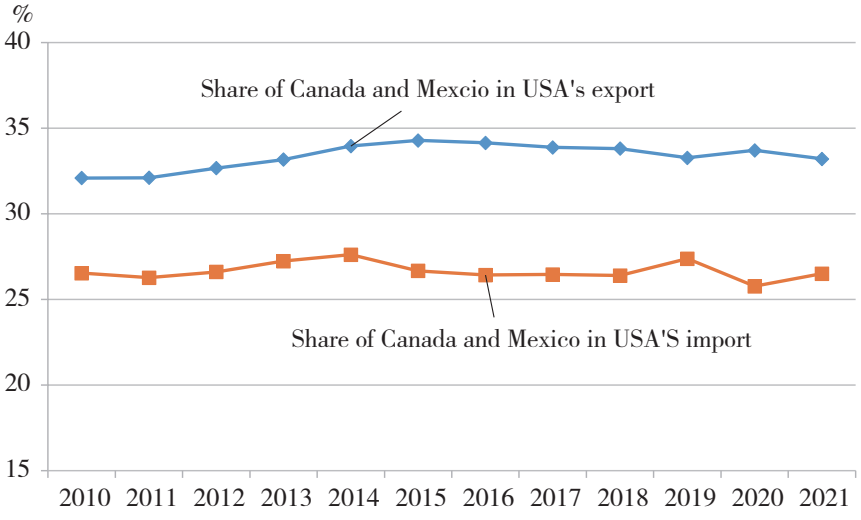

Fig. 7.3 Share of Canada and Mexico in USA's total trade, 2010-2021

Source: US Bureau of Economic Analysis.

The second is the European manufacturing hub, with Germany at the core, and France and the UK at the perimeter. The European manufacturing hub is where the modern industrial revolutions took place. With a long manufacturing history, it also has a large number of small and medium-sized enterprises (SMEs), which have injected vitality into the development of European manufacturing. In 2021, Germany's MVA accounted for 4.7% of the world's total, ranking fourth in the world. The share of France and the UK was 1.5% and 1.7%, respectively. Meanwhile, the MVA of the EU accounted for 15.6% of the world's total, roughly the same as that of the United States.

The third is the Asian manufacturing hub, with China, Japan, and South Korea at the core, and Southeast Asia, South Asia, and other countries at the perimeter. Thanks to the demographic dividend, a rapidly growing consumer market, and economic vitality, the Asian manufacturing hub has built the most complete industry chains in the world and is developing toward mid-to-high-end manufacturing. As for certain manufacturing technologies, it has even gained a competitive advantage over Europe and the United States. Since China joined the WTO in 2001, the proportion of China's MVA in the world's total has been growing steadily to surpass Germany in 2001, Japan in 2007, and the United States in 2010. By far, China has been the world's largest manufacturer for 12 consecutive years. In 2021, China's MVA reached 31.4 trillion yuan, accounting for 29.8% of the world's total, up from 18.2% in 2010. The MVA of Japan and South Korea accounted for about 7.8% and 3.0% of the world's total, respectively, making the two countries an important presence in the industry and supply chains of Asian manufacturing. Meanwhile, in Southeast Asia, Vietnam leverages its labor-cost advantage to actively undertake industrial transfers. As a result, its MVA grew from $15.01 billion in 2010 to $48.16 billion in 2021, though accounting for merely 0.3 % of the world's total. In South Asia, the MVA of India also grew from $285.35 billion in 2010 to $446.5 billion in 2021, accounting for roughly 2.7% of the world's total (see Fig. 7.4).

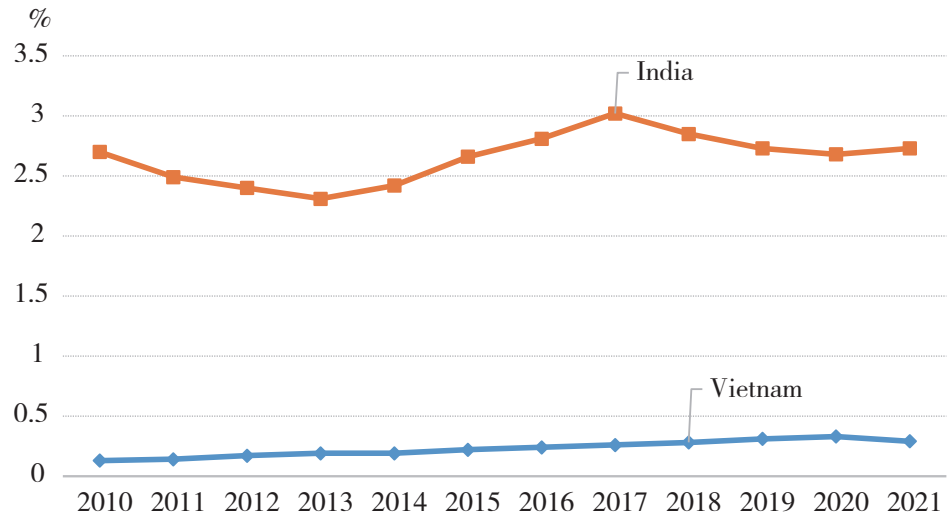

Fig. 7.4 MVA of Vietnam and India in the world's total, 2010-2021

Source: World Bank.

3. Global manufacturing has highly interdependent industry and supply chains

In the age of economic globalization, the manufacturing industry, which has a direct bearing on the world economy, has inseparable and highly interdependent industry and supply chains. This is mainly manifested in two aspects.

Firstly, more than 60% of the global trade in manufactured goods is done in Europe and Asia. From 2010 to 2021, the manufactured goods exports of East Asia and the Pacific, Europe and Central Asia, and North America accounted for a decreasing proportion of the world's total, down from 28.8%, 43.2%, and 12.7% in 2010 to 26.9%, 39.5%, and 11.8%, respectively, in 2021. However, the combined proportions of East Asia and the Pacific and Europe and Central Asia remained above 60% (see Fig. 7.5).

Secondly, the global trade in intermediate goods develops robustly. Trade in intermediates is one of the key indicators of the robustness of the global supply chain of manufacturing. McKinsey's report shows that in 1993, the global trade in intermediates accounted for about 1/4 of the global trade, yet now this proportion has exceeded 2/3. The total trade in intermediates of the top five countries accounts for more than 1/3 of the world's total. The WTO's quarterly report on global intermediate exports shows that global intermediate product exports maintained a 20%+ growth in each quarter of 2021, and the trade in intermediates of major exporting countries

exceeded the levels before the COVID-19 outbreak.[①]

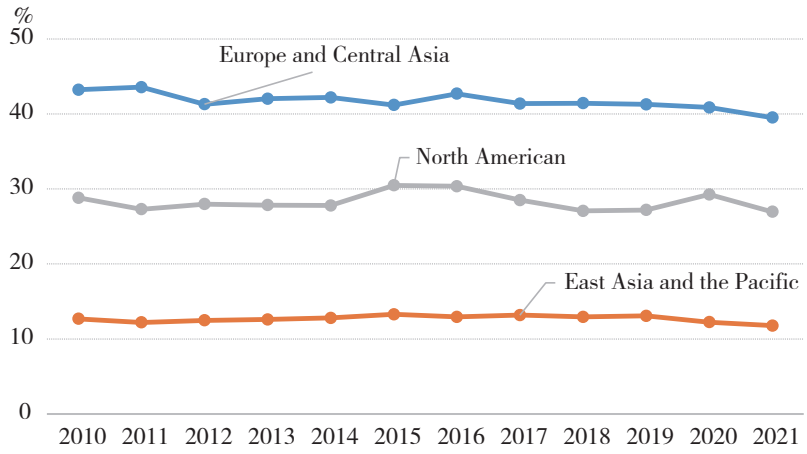

Fig. 7.5 Shares of three regions in the world's total manufactured goods exports, 2010-2021

Source: World Bank.

II. The Global Industry and Supply Chains Reshaped

The global manufacturing industry is facing a growing tendency of de-globalization and protectionism, the reformulation of international economic and trade rules, the efforts of developed countries to relocate industry chains back to their homelands, a new round of technological revolution, and the pursuit of a balance between efficiency and security by multinationals. As a result, the industry and supply chains tend to be more regional, local, diversified, and digitized.

1. Reformulation of international economic and trade rules to drive the regionalization and nearshoring of supply chains

Since the 2008 global financial crisis, economic globalization has entered a period of slowdown, divergence, and reformulation. As regional free trade agreements (FTAs), such as the Regional Comprehensive Economic Partnership (RCEP), the Comprehensive and Progressive Trans-Pacific Partnership (CPTPP), and the United States-Mexico-Canada Agreement (USMCA), were signed and implemented, intra-regional economic and trade cooperation is strengthening. These FTAs not only

① WTO (2022). Export of intermediate goods see continued growth in the fourth quarter of 2021. May 22. https://www.wto.org/english/news_e/news22_e/stat_25may22_e.htm.

promote the development of intra-regional trade and investment by reducing tariffs down to the point of zero tariffs but also include a series of high-standard and exclusive measures as barriers to trade and investment, thus forming exclusive supply chain alliances. For example, regarding the rules of origin, USMCA and CPTPP have set the "yarn forward" principle for textile and apparel products. CPTPP requires that the weight of non-originating fibers and yarns must not exceed 10% of that of the raw material components, rather than 10% of the total weight of the goods as stipulated in general trade agreements. The USMCA increased the regional value content for zero-tariff automobiles and their parts from 62.5% to 75%.[①] This regulation will urge key production links to relocate to the major production bases in North America, Europe, and Asia, thus making each of the three major networks more tightly knitted within.

2. The intensified game between China and the United States affects the supply chain landscape

The COVID-19 pandemic has intensified the game between China and the United States, leading the market logic, global governance, and trade rules to be replaced by long-arm jurisdiction and state interventionism, as containing China has become a key strategy of the United States. The United States has not only initiated challenges in the fields of economy, trade, high-tech, and manufacturing but also built de-Sinicized industry and supply chains by urging the American companies in China to return to their homeland and exerting ideological pressures. The game between China and the United States will lead to the reshaping of the global economic and political landscape, which in turn will promote the reconfiguration of the global manufacturing industry and supply chains.

a. The United States continues to upgrade its supply chain security strategy by moving US manufacturers back to their homeland

Manufacturing has always been a key area in the strategic game between China and the United States. In this context, the industry and supply chains have become the focal point that attracts the attention of both countries. The United States has always emphasized that manufacturing supply chain security has a bearing on national

① *China Economic Times*, China should speed up its adaptation to the new international economic and trade rules, July 27, 2020, https://jjsb.cet.com.cn/show_514954.html.

strategic security. To safeguard the economy, people's livelihood, and national security, the United States must ensure sufficient supply and flexibility of key products that cannot be produced domestically. In 2018, the United States began to issue a series of administrative decrees and policies which comprehensively assess its industry and supply chain security, dependence on foreign countries, and specific responses in manufacturing and defense industries, as part of an effort to cope with the fierce international competition. Since the COVID-19 outbreak in 2020, the US's supply chain security strategy has been upgraded continuously to cope with China's growing influence.

Box 7-1 United States initiatives related to global supply chains in recent years

In May 2018, the US Department of Defense Office of Industrial Policy joined hands with multiple departments to issue the report "Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States". Key findings of the report include: the United States currently has a high degree of dependence on competitor countries; many United States sectors are still moving critical capabilities overseas to seek competitive prices and to penetrate foreign markets.

In June 2019, the US Department of Commerce released a report titled "A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals", which finds that the United States is heavily dependent on foreign sources of critical minerals and foreign supply chains. Specifically, the United States is import-reliant (imports are greater than 50 percent of annual consumption) for 31 of the 35 minerals designated as critical by the Department of the Interior. The United States does not have any domestic production and relies completely on imports to supply its demand for 14 critical minerals.

In January 2021, the US Department of Commerce issued the Executive Order: Securing the Information and Communications Technology and Services Supply Chain, which proposes the establishment and improvement of processes and procedures "for identifying, assessing, and processing information and communications technologies or services designed, developed, manufactured, or supplied by persons owned by, controlled by, or subject to the jurisdiction or direction of a foreign adversary".

In February 2021, US President Biden signed the "US Supply Chain Executive Order", which includes a supply chain risk review and industry and supply chain assessment, intending to strengthen the flexibility, diversity, and security of the US supply

chains, and recover and revitalize the country's manufacturing capabilities.

In June 2021, the US Senate passed the "United States Innovation and Competition Act of 2021", which specifies that the United States will promote the development of US semiconductors, microchips, telecommunications equipment, artificial intelligence, and other fields, in an effort to tackle the increasingly fierce international competition, especially China's growing influence, and to reduce dependence on Chinese companies for production.

In June 2021, the US government released a new report titled "Building Resilient Supply Chains, Revitalizing American Manufacturing", which proposes that for the supply chain of critical products, the United States should not only invest in domestic R&D and production, and cultivate high-skilled workers, but establish a US Trade Representative-led trade strike force to identify unfair foreign trade practices that have eroded US critical supply chains and make amends through tariff and other trade-related measures.

In June 2022, the US Congressional Research Service submitted to Congress the "Summary of Selected Biden Administration Actions on Supply Chains", which presents a series of executive orders aimed at addressing supply chain problems and other measures taken to reduce supply chain disruptions.

b. Excluding China from the industry and supply chains of key industries by establishing alliances

To prevent the rise of key Chinese manufacturing industries, such as chips, and to maintain its advantages in the high-tech industry chains, the United States and other countries intend to exclude China by establishing key industrial alliances. In May 2021, the United States proposed to forge the Semiconductors in America Coalition (SIAC) by incorporating a total of 64 semiconductor companies from Europe, Japan, South Korea, Chinese Taipei, and other regions. Mainland Chinese companies were excluded. In February 2022, the US House of Representatives passed the America COMPETES Act of 2022, which pledges to provide substantive support for chip manufacturing, and semiconductor production. Specific measures include the creation of a chip fund, the allocation of $52 billion to encourage companies to invest in the semiconductor industry, and the authorization of $45 billion for improving US supply chains and strengthening manufacturing. In April 2022, the United States proposed to form the Chip4 Alliance

with Japan, South Korea, and Chinese Taipei, to establish a new semiconductor supply chain to curb the development of the semiconductor industry in mainland China. It is foreseeable that the United States will launch more measures in an attempt to exclude mainland China from high-end chip manufacturing and supply. On August 9, 2022, Biden signed the Chip and Science Act, which pledges to provide a subsidy of $52.7 billion for US semiconductor R&D, manufacturing, and workforce development, but requires that any company receiving the subsidy must make chips on US soil. The United States has continued to set blockades on China's advanced technologies by calling on Western countries to form export control alliances in high-tech fields.

c. The United States attempts to reconstruct a global supply chain system with itself at the core, and promote the de-Sinicization in the manufacturing sector

Since the Biden administration came to power, it has made continued efforts to strengthen cooperation with its allies, such as Japan and South Korea, in the name of multilateralism. For example, in May 2022, the Indo-Pacific Economic Framework for Prosperity (IPEF) was launched, which was joined by the United States, Japan, Australia, South Korea, India, and other countries and regions. In terms of supply chain cooperation, the framework plans to establish an early warning system to enhance the traceability of key supply chain links, such as raw materials, semiconductors, key minerals, and clean energy technologies. It also pledges to cooperate with participating countries to promote a diversified production layout. Diversification is, in essence, "limited globalization", that is, avoiding excessive dependence on specific countries for manufacturing. Each participating country had its strategic considerations for joining the framework, but there is also the possibility that the United States and its allies promote the de-Sinification of global supply chains through non-market-oriented means, such as political and economic bundling and direct subsidies. Besides, the complex and volatile world nowadays makes it increasingly difficult to separate economic and trade from broader national interest considerations, including national security. Therefore, the United States is trying to promote trade integration to reshape free trade values so that it can trade only with "countries it can count on". Therefore, the values and supply chain vulnerability may become considerations for developed countries to reconstruct the international trade landscape, which in turn will fundamentally impact the multilateral trading system and aggravate risks in global supply chains.

3. Developed and developing countries promote the localization and friend-shoring of supply chains

After the 2008 financial crisis, the global economy started to fall back to the real economy; developed countries started to implement the reindustrialization strategy; and major emerging economies vied to adopt preferential policies to improve the investment environment, thus triggering a new round of competition among countries in manufacturing.

On the one hand, developed economies, such as the US, the EU, and Japan have tried to revive their manufacturing industries in recent years by encouraging their manufacturers overseas to return to their homeland. The COVID-19 pandemic has shed light on the importance of supply chain security. Out of emergency security, basic security, economic development, and social stability considerations, developed countries have adopted legal regulations, economic subsidies, and political means to encourage domestic enterprises to increase investment in their home countries. For example, in the Strategic Competition Act of 2021, the United States explicitly proposed to appropriate $15,000,000 for each fiscal year from 2022 through 2027 to support supply chains to exit from China market and identify alternative markets for production or sourcing outside of China. The Japanese government allocated 220 billion yen in 2020 to encourage Japanese companies to return to Japan or transfer to other countries. In the Basic Policy on Economic and Fiscal Management and Reform issued in June 2021, the Japanese government proposed to focus on investing in strategic products, such as semiconductors, to rebuild the country's production system, and encourage enterprises to diversify and decentralize their production bases. These measures will, to a degree, change the regional layout of value chains and make them more local.

On the other hand, Southeast Asian and South Asian countries represented by Vietnam and India leveraged their cheap labor and investment policies to vigorously attract foreign investment and undertake international industrial transfers. These moves have led some foreign-funded enterprises in China to relocate to Vietnam, India, and other countries. Lately, Vietnam has become one of the major destinations for investment from multinationals thanks to its open market environment, superior geographical location, abundant and cheap labor resources, and multilateral and bilateral FTAs signed with other countries and regions. From 2012 to 2021, the amount

of foreign capital utilized by Vietnam's manufacturing industry rose, albeit fluctuations, from $5.46 billion to $18.1 billion (see Fig. 7.6).

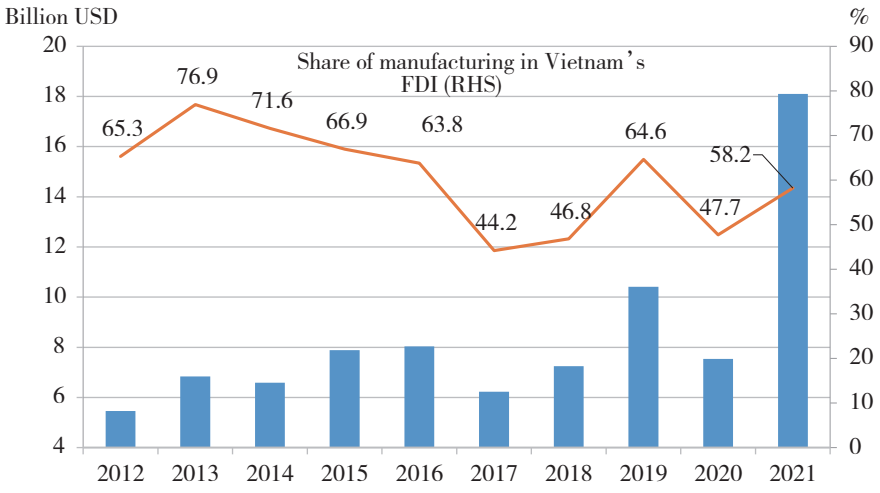

Fig. 7.6 FDI in Vietnam's manufacturing, 2012-2021

Source: Foreign Investment Agency, Ministry of Planning and Investment, Vietnam.

Moreover, Vietnam has a massive labor market -- people aged 15-64 account for about 70% of its population, and the labor costs are relatively low. In 2020, the average hourly wage in Vietnam was $2.99, while that in China was $6.50 (see Fig. 7.7). In addition, Vietnam introduced a series of tax exemptions and cuts to attract investment. These preferential policies did attract some multinationals to relocate from China to Vietnam.

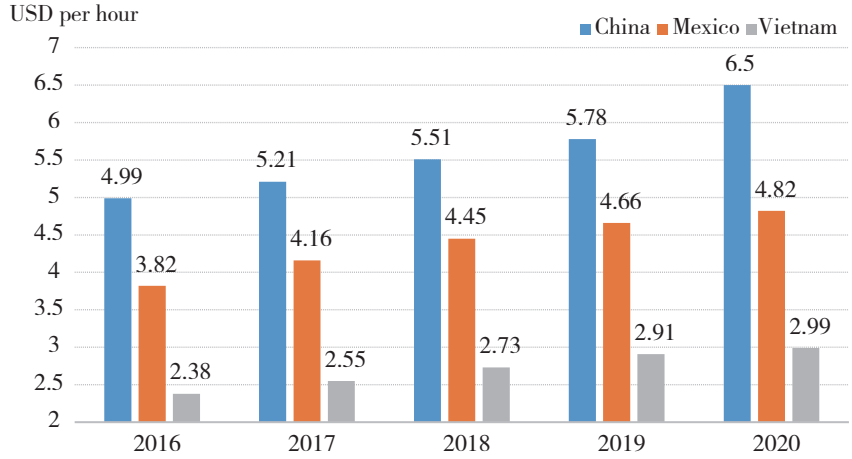

Fig. 7.7 Hourly labor costs in the manufacturing of China, Mexico and Vietnam, 2016-2020

Source: Statista.

Another example is India, which launched a series of policies such as "Made in India", "National Manufacturing Policy" and "Indian Skills" in the past five years, aiming to promote India as a global manufacturing hub. For example, India lowered the basic tax rate for newly established and operating manufacturers from October 1, 2019, to March 31, 2023, from 25% to 15%, to further attract international investment. Meanwhile, the import tariffs of mobile phones and their components were raised, so that their manufacturers had to build factories in India. These policies have urged some multinationals to transfer their supply chains from China to India, thus enabling the rapid rise of India's manufacturing industry. In the automobile industry, eight of the top ten Indian auto companies in the 2021-2022 fiscal year were foreign-owned companies, with Japan's Suzuki (43.65%) and South Korea's Hyundai (15.78%) accounting for nearly 60%. In the mobile phone industry, the top five mobile phone manufacturers in India in 2021 were all foreign-funded companies, of which 67% were Chinese ones.

4. Multinationals make strategic adjustments to diversify the global supply chain layout

As economic globalization proceeds, multinationals lead the internationalization of production through international investment. They play as organizers of the world's production to build global value, industry, and supply chains. Multinationals invest on a global scale, mainly in pursuit of maximized profits, lower costs, and higher efficiency. Recent years have seen the rise of trade protectionism, the impact of the COVID-19 pandemic, intensified geopolitical conflicts, and growing global supply chain risks. These factors, coupled with the pressure from the government of their home country, have forced multinationals to change the way they plan and obtain supply chains.

In the short term, the global layout of multinationals will not undergo substantial changes but may scale down their operations. Over the past few years, cross-border investment has not been as robust as it used to be. According to UNCTAD statistics, the size of global manufacturing FDI absorption is going downward, from $775.20 billion in 2018 to $535.48 billion in 2021, a decline of 30.9%. Its proportion in the world's total also dropped from 48.5% in 2017 to 38.6% in 2021 (see Fig. 7.8). The pandemic has seriously impacted the operations of most multinationals, whose profitability has plummeted. The COVID-19 pandemic has put the world economy in distress. As companies become more cautious in their global investment, cross-border

investment activities will be subject to heightened pressures. Most multinationals choose to wait and see as they slow their pace of global investment, especially in large projects. Meanwhile, the headquarters of multinationals will pay more attention to cash and profitability. Some multinationals may suspend overseas businesses with uncertain prospects and speed up the divestiture of non-performing assets. Multinationals may, to a degree, shorten their global supply chains.

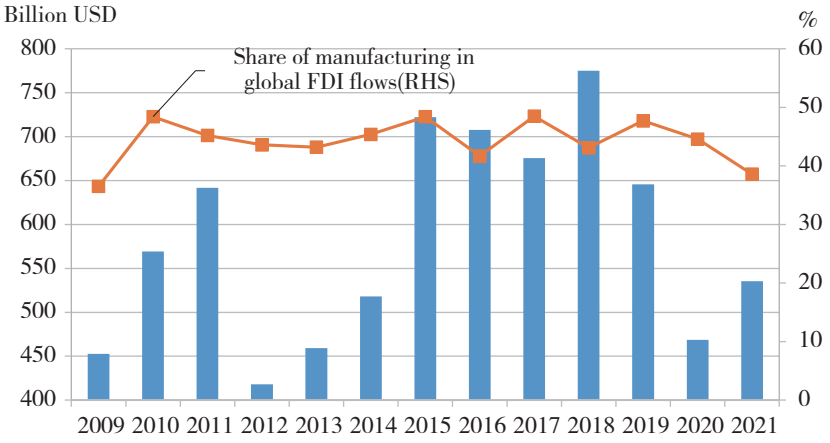

Fig. 7.8 FDI in global manufacturing, 2009-2021

Source: UNCTAD.

In the long run, multinationals will take the initiative to adjust the layout of industry and supply chains out of safety and efficiency considerations. Global supply chain disruptions caused by the pandemic have brought huge pressures on the production and operations of multinationals, making them feel the urgency of dispersing supply chain risks. Therefore, they start to exert stricter control over costs and efficiency and take the initiative to adjust the supply chain layout, in order to strike a balance between safety and efficiency. As such, the way in which the global supply chains are organized will undergo significant changes, while the global supply chain layout relying on the global free trade system and intra-product specialization will be deconstructed. Besides, in recent years, multinationals have been adjusting the layout of their supply chains, either actively or passively. In the context of economic globalization, multinationals take profit maximization as their utmost goal. That is why their interests are not always in line with those of their home country. When multinationals expand their overseas markets, there is also a need to cater to the

demand of the home country's government in urging them to return. However, to maximize their interests, some multinationals may use alternative methods to achieve a balance between the two. As the international political landscape changes in the post-pandemic era and developed countries led by the United States reconstruct an independent and complete industrial system, multinationals may choose to diversify their supply chains. But to pursue maximized profits, they will not relocate the entire industry chains they invested in countries of high growth and high returns back to their home country or other countries.

5. The new round of technological revolution promotes the digitization and intelligence of supply chains

Along with the new technological revolution and industrial transformation, big data, the Internet of Things, artificial intelligence, and 3D printing are gradually penetrating into all aspects of the industry and supply chains, thus fundamentally changing the ways in which R&D and manufacturing and trade are done and industries are organized.

a. The technological revolution promotes the change in the mode of production and makes the industry and supply chains shorter and more intelligent

On the one hand, the combination of internet technology and manufacturing has made the R&D design, production, and sales management more segmented, the production more decentralized, the factories smaller, and the lead time significantly shorter, thereby shortening the industry and supply chains. For example, 3D printing technology will make local production possible. On the other hand, 4D printing technology, which is a combination of intelligent manufacturing, intelligent materials, and 3D printing, drives the transformation of the manufacturing industry from a mass-standardized production approach to an intelligent mass-customized one supported by the internet. As raw material procurement, product processing, and market sales will all be completed locally, dramatic changes will take place in the supply chain systems of companies.

b. The technological revolution makes it faster for machines to replace human labor, which may consolidate the division of labor in the global industry and supply chains

According to the International Federation of Robotics (IFR), the global robot sales

in 2021 reached 486,800 units, a significant increase of 27% year-on-year, of which Asia and Australia registered the largest growth rate of 33%, totaling 354,500 units. The electronics industry (132,000 units) and the automotive industry (109,000 units) are the two industries with the greatest demand for industrial robots, followed by the metal and machinery industry (57,000 units), the plastics and chemical industry (22,500 units), and the food and beverage industry (15,300 units)[①]. The pandemic has made countries more willing to replace human labor with machines, as they hope to produce faster and more efficiently at lower costs. Compared with developing countries that lag behind economically, developed countries and emerging markets, such as China, have obvious advantages in technology and digital economy. The use of machines to replace human labor may change the past practice in which manufacturers tended to move to countries with lower labor costs. Meanwhile, data will become an important factor of production that lead to substantial changes in the factor endowments between different economies. Such changes will fundamentally affect the investment decisions of multinationals and prompt the industry and supply chains to tilt towards developed economies or developing countries with advantages in digital technology.

c. New products and services brought about by advanced technologies may affect the layout of the global industry and supply chains

The use of digital technology may change the products and services of certain sectors, generate new business forms or new products and services, and even affect the content and quantity of trade flows. For example, thanks to digital technology, new energy technology, and government subsidies, pure electric vehicles registered a sales amount of approximately 4.6 million units in 2021, a YoY increase of 220%, while the number for hybrid electric vehicles was approximately 3.1 million, a YoY increase of 33% only[②]. Going forward, the growing sales of electric vehicles may partially replace the trade volume of auto parts, and also inhibit the import of oil. This will have a greater impact on the imports, exports, and supply chains of related industries and countries or regions.

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① Xinhua Finance, Global robot sales grew robustly in 2021, June 23, 2022, https://baijiahao.baidu.com/s?id=1736378027211376076&wfr=spider&for=pc.

② Changjiang Daily, Global sales of pure electric vehicles surpass that of hybrid vehicles for the first time in 2021, April 21, 2022, https://baijiahao.baidu.com/s?id=1730685652324221408&wfr=spider&for=pc.

III. Challenges and Opportunities Facing China's Manufacturing Industry

China's manufacturing industry has maintained steady growth and has been one of the centers of the global manufacturing industry chains and supply chains. With the accelerated adjustment of these chains, China's manufacturing will inevitably face great challenges. However, we can see that under the pandemic, global prices have risen, the trade structure has undergone major changes, and industrial chains and supply chains of many countries have shrunk. Only China's industrial chains and supply chains are relatively stable. At the same time, new competitive advantages of China's manufacturing are being fostered to be more deeply integrated into the global supply chain system. It is difficult to cut the global supply chain artificially.

1. Current situation of China's manufacturing industry

China's manufacturing is rather sound as a system. Its scale ranks first in the world, its status of export competitiveness and international division of labor are constantly improving, and its impact on the world's manufacturing chains is gradually increasing. China is moving from a big manufacturing country to a strong manufacturing power.

First, the structure of China's manufacturing is sound and its scale continues to grow steadily. China's manufacturing has 41 major categories, 207 medium categories and 666 small categories. It is the only country in the world that has all the industrial categories in the International Standard of Industrial Classification released by the United Nations. It has set up many industrial clusters with centralized product production, professional cooperation, and mature industrial chains. These industrial chains and supply chains have strong resilience. Most of China's industrial categories account for more than 30 percent of the world's production, including 90 percent of the world's personal computers, 80 percent of air conditioners, 75 percent of solar panels, 70 percent of mobile phones and 63 percent of shoes. More than 40 percent of the world's 500 major industrial products are contributed by China, which ranks first in the world. In the 21st century, added value of China's manufacturing has grown rapidly, gradually surpassing developed countries such as Japan, Germany and the United State. From 2004 to 2021, China's manufacturing added value grew 12.8 percent annually. In the past three years, China has withstood the test of the COVID-19 and the drastic

changes in international environment by its strong capacity in manufacturing.

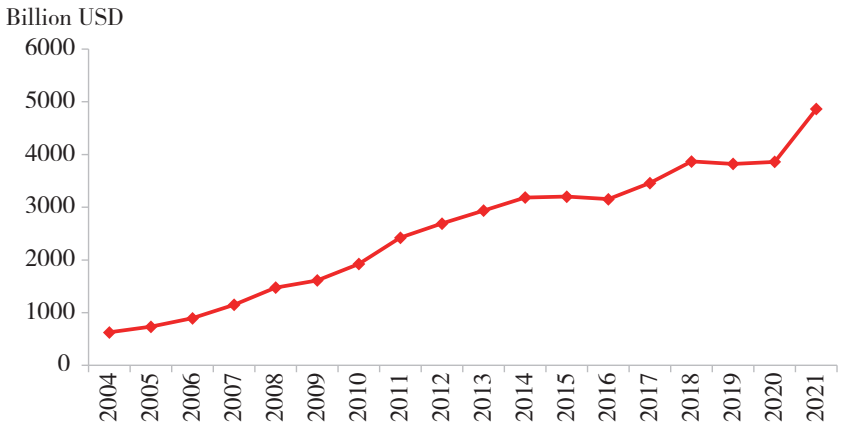

Fig. 7.9 Value added of China's manufacturing industry, 2004-2021

Source: World Bank.

Secondly, China is deeply integrated into global industrial chains and supply chains and highly dependent on each other. Along this process, China's economy is playing an increasingly important role in the global trade and production system. From 2003 to 2021, China's imports increased from $0.41 trillion to $2.69 trillion, accounting 11.9 percent to global imports from 4.4 percent; China's exports increased from $0.45 trillion to $3.36 trillion, accounting 15.1 percent to global exports from 4.7 percent. At the same time, China has become the largest country with a contribution of 20 percent to global trade in intermediate goods. According to the WTO, China exported $1.458 trillion intermediate goods to others in 2021, 1.8 times and 2 times that of the United States (second) and Germany (third), respectively; and imported $1.676 trillion intermediate goods, 65 percent and 176 percent higher than that of the United States (second) and Germany (third).

Third, China's manufacturing industry is moving toward the middle and high-end, which constantly increases its international competitiveness. By firmly grasping the trend of scientific and technological revolution as well as promoting the intelligent upgrading of the manufacturing industry, *made in China* is moving towards *creation in China*. China's export of technology intensive electromechanical products and high-tech products has basically doubled from RMB 7.4 trillion yuan and 3.8 trillion yuan in 2012 to 12.8 trillion yuan and 6.3 trillion yuan in 2021. From the perspective of innovation investment, the R&D intensity of China's manufacturing industry has

increased from 0.85 percent to 1.54 percent during the same period. The average R&D intensity of *small giants* specializing in special new products has reached 10.3 percent, and more than 570 industrial enterprises have been shortlisted among the top 2500 global R&D investment enterprises. According to United Nations Industrial Development Organization, China's competitiveness in manufacturing ranks second in the world, only lower to Germany. In the list of the world's top 500 enterprises released in August 2022, 78 Chinese industrial enterprises were shortlisted with an increase of 33 over 2012.

2. The stability and security of China's manufacturing chains are facing challenges

In recent years, some labor-intensive industries and low value-added technology intensive industries in China have tended to transferring to Southeast Asian countries due to the weakening of the demographic dividend, the rise of factor costs and Sino-US economic and trade friction. In the long run, with the adjustment of the global manufacturing chains in the direction of regionalization, diversification, nearshore and localization, China's manufacturing industry will also face the pressure of competition in international investment and optimization and upgrading of industrial structure.

First, the intensified competition in foreign investment will have a certain impact on China's manufacturing industry. On the one hand, many countries have begun to emphasize the autonomy and controllability of industrial chains, gradually attached importance to the development of their own manufacturing, guided the return of key industries and reduced their investment abroad. On the other hand, more emerging developing countries are also actively attracting foreign investment in manufacturing, and the new investment around the world shows a decentralized trend. These objective factors have intensified the competition in global manufacturing industry, may making foreign investment in China's manufacturing downward in the future.

Second, the superposition of multiple internal and external factors has accelerated the transfer of some manufacturing from China. In recent years, some labor-intensive industries or low value-added processing and manufacturing have shown a trend of shifting to Southeast Asia and other countries. For example, Adidas, Nike, Nintendo, Samsung, etc. have gradually moved their factories from China to Vietnam. Thus, Vietnam has become Samsung's largest mobile phone production base in the world,

and more than 50% of Samsung's mobile phone are exported by Vietnam. In the future, with the transformation and upgrading of China's industry and the intensification of competition for investment from Vietnam, India and other economies, such transfer of Chinese industry may be further accelerated.

Third, the disturbed global supply chain system has affected the upgrading of China's manufacturing. The interruption in the supply of high-end parts and technologies has a great impact on Chinese enterprises and their downstream that are highly embedded in the global supply chains. The supply of key technologies and products in the Chinese manufacturing supply chains has been restricted in recent years, which was harmful to the upgrading of China's industrial structure.

3. New competitive advantages of China's manufacturing chains are being fostered

Influenced by the objective laws of economic development, coupled with the superimposed impact of the anti-globalization trend, Sino-US economic and trade friction and the COVID-19 pandemic in recent years, the competitive advantage of China's manufacturing industry is changing.

a. The Low-cost advantage is being transformed to comprehensive-cost performance advantage

A key factor for China to become a *world factory* and a center for global supply chains is its significant advantage of low-cost manufacturing. However, this advantage weakened in recent years. For example, in terms of monthly wages in the manufacturing, China grew 9.84 percent by average from 2016 to 2020, significantly higher than those of developed countries such as the United States (3.77 percent), Japan (0.75 percent), South Korea (1.60 percent), and also higher than those of other developing countries such as Vietnam (4.54 percent), India (1.47 percent). In terms of level, China's labor cost lies between developed countries and other developing countries. In 2020, the United States, South Korea and Japan were 4.8, 3.8 and 2.6 times that of China, respectively. The average monthly wage of manufacturing in Vietnam and India was 1 / 3 and 1 / 5 of that of China (see Fig. 7.10). In addition, the energy cost and the total tax rate of China's manufacturing industry are also relatively high.

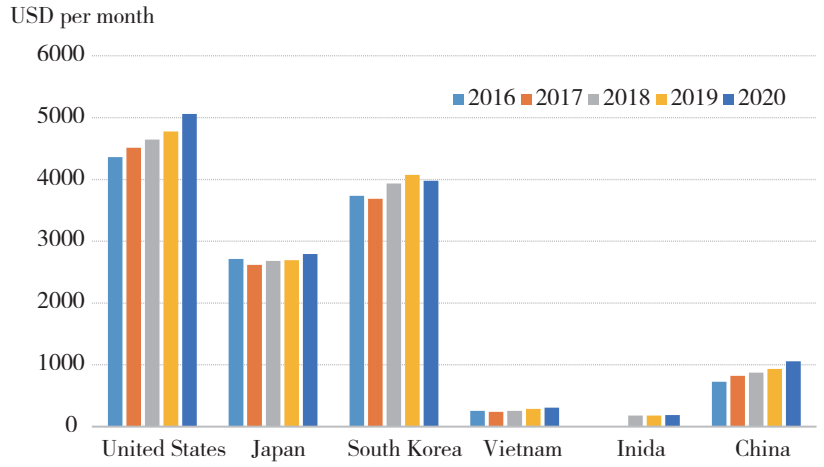

Fig. 7.10 Monthly wage rate in manufacturing: United States, Japan, South Korea, Vietnam, India and China, 2016-2020

Source: ILO, National Bureau of Statistics of China.

However, China's cost-effective advantages in labor productivity, supply-chain efficiency and business environment are increasingly prominent. From 2010 to 2021, China's annual average growth rate of labor productivity was 6.7 percent, 5.1 percentage higher than the global average (1.6 percent), also significantly higher than Vietnam (5 percent), India (5.5 percent), Thailand (2.1 percent), Indonesia (2.5 percent) and the Philippines (3 percent) and other Southeast Asian countries. Thus, China has become one of the countries with the fastest growth rate of global labor productivity. It has reached $16,512 per labor in 2021, which is also at a high level in the world (see Fig. 7.11). At the same time, the ranking of China's business environment has also been improved in recent years. In 2021, China's business environment score was

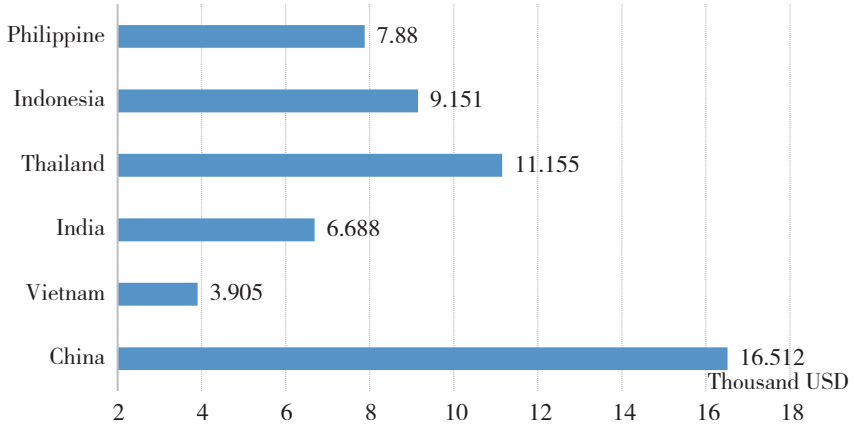

Fig. 7.11 Labor productivity: China, India, Indonesia, Philippine, Thailand, and Vietnam, 2021

Source: ILO.

4.38, an increase of 0.03 points year-on-year. More than 50 percent of foreign-funded enterprises regard China as the world's top investment destination. Judging from this, China still has a strong attraction to global manufacturing enterprises.

b. Transform the advantage of scale into the advantage of innovation

At present, China's advantages in the global supply chains are mainly concentrated in the field of large-scale production and manufacturing. However, in recent years, the innovation of digital technologies such as the internet, big data, cloud computing, artificial intelligence, and blockchain have accelerated, and are becoming a key force in reorganizing global manufacturing factor resources and changing the layout of global supply chains. China's advantages of large space for development, multiple scenarios for application and strong innovation will gradually become prominent, which help China to become an important region for the market application and industrial transformation of advanced technologies in the world. China's advantages in scientific and technological innovation have been continuously strengthened. Its R&D intensity has increased from 1.9% to 2.4 percent, basically reaching the average level of 2.5 percent of OECD countries (before the pandemic) (see Fig. 7.12).

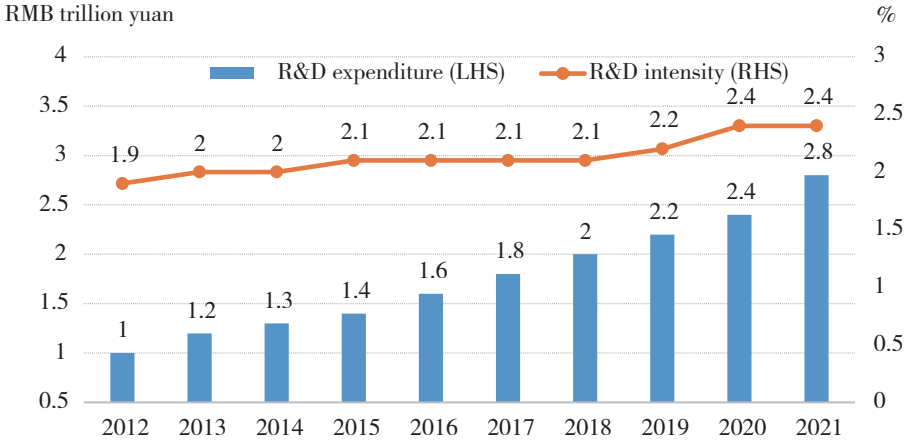

Fig. 7.12 R&D expenditure: China, 2012-2021

Source: National Bureau of Statistics of China.

New generation of information technology is accelerating its penetration into the manufacturing industry, which brings new advantages in promoting the digital transformation of the manufacturing industry. At present, the share of digital controlled parts among key processes of industrial enterprises above designated size in China has reached 55.3 percent, and the penetration rate of digital R&D tools has reached 74.7

percent. The share of enterprises carrying out networked collaboration and service-oriented manufacturing reached 38.8 percent and 29.6 percent respectively (see Fig. 7.13). China is also the country with the largest number of '*Lighthouse' factories* in the world. Among the 44 members of *Global Lighthouse Network* announced by the World Economic Forum (WEF), 12 are located in China, which is significantly higher than Germany (4), the United States (3), Japan (2) and other countries. China leads the world in terms of digital infrastructure and governance environment, providing the best fundamental market environment for the next stage of development in intelligent supply chains. This will attract global innovative enterprises to accelerate the agglomeration in Chin, which promotes China's transformation to a highland for innovation and application in global supply chains.

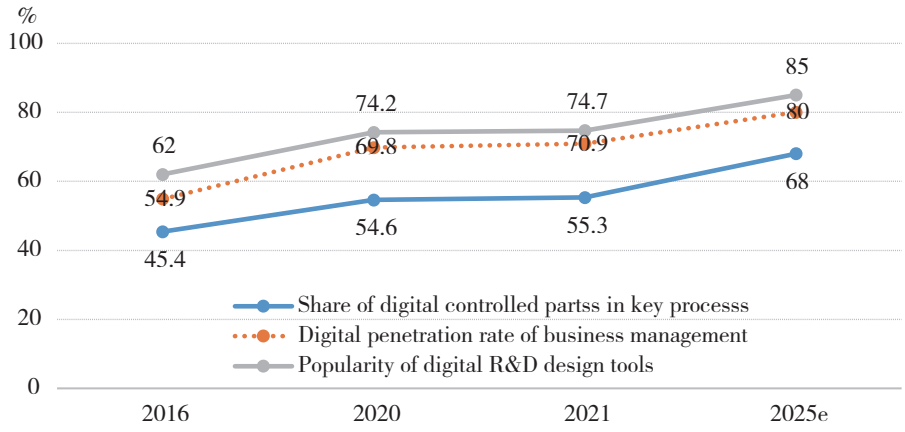

Fig. 7.13 Digitalization in manufacturing: China, 2016-2025

Source: National Bureau of Statistics of China; Ministry of Industry and Information of China.

c. Transform the advantage of extensity expansion into the advantage of intensity dominance

With the adjustment of the global supply chains to regionalization, the scale of interregional trade is gradually shrinking, which will limit the extensity of China's radiation to the global market as a *world factory*. However, relying on China's vibrant domestic market and Asian regional market, the status of *China factory* and *regional factory* will become more prominent, and China's expansion in intensity dominance in regional markets are expected to be strengthened. Along with the trend of more regionalization and localization, global supply chains will be further arranged around the main global markets.

On the one hand, the great demand of China's huge market for final consumer goods and intermediate goods has a strong magnetic attraction on the investment of multinational enterprises. It is estimated that by 2027, 1.2 billion people in China will be in the middle class, accounting for one fourth of the world's total. According to Purchasing Power Parity (PPP), about one quarter of global consumption growth in the next decade may happen in China. By 2030, the number of middle and high-income families in China may increase to about 400 million, close to the sum of Europe and the United States. On the other hand, the Asian market is active. In 2021, it also took the lead in achieving recovery under the impact of the pandemic: calculated by PPP, the Asia's share in world's real GDP rose to 47.4 percent (see Fig. 7.14) [①], which was only 32 percent in 2000. It is expected that this share will continue to increase to 52 percent by 2040.[②]。

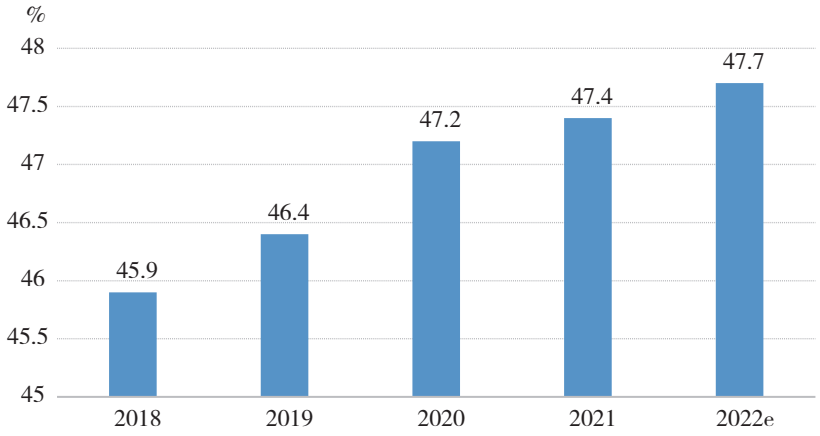

Fig. 7.14 Share of Asia in world real GDP, 2018-2022

Source: the Boao Forum for Asia.

Asia has become an important force to revitalize global trade and develop industrial and supply chains. China has also fostered a pattern of supply chains that cooperates with neighboring economies. In line with the general trend of decentralized distribution of global supply chains, China will establish a closer supply chain network

① The Boao Forum for Asia (2022). Asian Economic Outlook and Integration Progress Annual Report 2022. https://english.boaoforum.org/newsDetial.html?navId=6&itemId=2&permissionId=519&detialId=15121.

② McKinsey Global Institute (September 2019). Asia's future is now. www.mckinsey.com/featured-insights/future-of-asia.

with other Asian economies so as to consolidate the advantage of dominating regional markets by strong capacity of supply and huge demand market. While continuing to expand the scope of global cooperation, China will strive to be a global center by enabling Asia and Asian supply chain networks.

d. Transform the advantage of "domestic manufacturing base" into the advantage of "global manufacturing network"

Compared with developed countries such as the United States, Europe and Japan, China's dominant position in global supply chains is mainly based on *local* advantages. However, with the acceleration of internationalization of Chinese enterprises and preliminary improvement of their overseas supply chains, the new competitive advantage of "internal and external coordination" of China's supply chains is being shaped. In 2021, China's overseas direct investment was 145.2 billion US dollars with an YoY growth of 9.2 percent. Among them, China's domestic investors have made non-financial direct investment in 6,349 overseas enterprises across 166 economies, with a cumulative investment of 113.6 billion US dollars and a YoY growth of 3.2 percent. China has become a major international investor in the world, and ranks as one of the top investors in the world by overseas investment stock. Specially, China's overseas investment in the economies along the "the Belt and Road" Initiative has increased rapidly, and the number of big foreign contracted projects has increased, mainly in infrastructure and related manufacturing. China's overseas investment covers 70 percent of the world's economies and builds links with main categories of China's domestic manufacturing. During the pandemic, these overseas enterprises performed well in ensuring China's domestic markets. This means that China's advantage in supply chains will be further enhanced as China's manufacturing extends overseas, and transform to be based rather on "China's global manufacturing network" rather than on "China's domestic manufacturing capacity".

IV. Supply Chain Resilience in the Process of Globalization

In response to the changes in the global manufacturing industry and the risk of global supply chain disruptions caused by emergencies such as the pandemic, all countries should join hands to further strengthen infrastructure construction, accelerate the digital transformation of industries, and promote trade and investment liberalization

and facilitation, strengthen global macro policy coordination, so as to improve international governance capabilities and establish a safe, reliable, and flexible industry and supply chain system.

1. Strengthening infrastructure construction and improving the level of industrial cooperation

Since 2021, black swan events have kept emerging, e.g. the Suez Canal obstruction, the cold wave hitting the North American continent, and the big supply chain congestion in the United States. These events reveal that there are still loopholes in global transportation and logistics infrastructure, which are not easy to overcome. Coupled with the impact of the pandemic, supply chain disruptions have occurred frequently as factories around the world have difficulties starting operations, and suffer from insufficient production capacity, decreased transportation capacity, and inventory shortages due to insufficient supply. Therefore, in the context of economic globalization, strengthening infrastructure construction and improving the level of industrial cooperation is of great importance to ensure the stability of industry and supply chains.

The first is to ensure quality when building the "Belt and Road" and vigorously promote the interconnection of traditional infrastructure, e.g. transportation and logistics. Countries along the Belt and Road should invest more in highways, railways, shipping, aviation, and other fields, strengthen the mutual recognition of standards and rules, and break traffic and logistics congestion points, in an effort to build stable transportation channels for energy, resources, and products, and realize the coordinated development of supply chains through cooperation.

The second is to strengthen the construction of new infrastructure and improve the intelligence level of transportation and logistics. Efforts should be stepped up to achieve integrated development of traditional transportation and logistics with 5G, big data, cloud computing, and other digital technologies, to enhance the level of automation and intelligence of ports, airports, and railway transportation, to improve transportation efficiency, and to reduce dependence on human factors.

The third is to deepen industrial cooperation among countries, leverage international production capacity cooperation to promote the orderly transfer of capital-intensive, technology-intensive, and labor-intensive industries among countries, and

give play to the comparative advantages of each country to build a robust system of division of labor.

2. Stepping up the digital transformation of the manufacturing industry and optimizing the global layout of supply chains

The pandemic has hindered the flow of people, logistics, and transportation, thus leading to the low operational efficiency of supply chains. Nevertheless, it is easier for highly-digitized enterprises to break through the boundaries of space to enable more extensive multi-party collaboration and communication in more fields and industries. According to UNCTAD statistics, in 2021, the net income of the top 100 digital multinationals in the world rose by 60%, while that of the top 100 traditional multinationals grew slowly.

The first is to actively develop new businesses, products, and models leveraging 5G, smart economy, and big data to build a new model organized by the government and led by the market that combines digital technologies with traditional manufacturers.

The second is to improve the digital level of large multinationals, especially manufacturers so that they can play a pivotal role to coordinate upstream and downstream enterprises, integrate and allocate production resources, and deepen strategic cooperation with SMEs. All these are aimed at building efficient, collaborative, agile, and flexible supply chains, strengthening control over industry chains, and optimizing the global layout of industry and supply chains.

The third is to improve the digital level of SMEs, use reasonable digital solutions to achieve information sharing and flexible adjustments, and encourage SMEs to increase their capacity to turn out products that are new, distinctive, specialized, and sophisticated to build their advantages. All these are aimed to improve their survivability so that they can better merge into the supply chain system of large enterprises.

3.Strengthening the coordination of industry and supply chain policies to improve international governance capabilities

Recent years have seen the global industry chains become regionalized, localized, and shortened, while the risks of chain disruptions and decoupling continue to rise. One of the reasons is the pandemic, of course, but the main reason is the decline in the

international governance level due to insufficient policy coordination among countries. To improve the resilience of the global manufacturing industry and supply chains, countries must build a consensus on cooperation, continue to expand the scale of trade and investment, and strengthen cooperation in key industries and fields.

The first is to continue maintaining the multilateral trade system with the WTO at its core, strengthening the communication and coordination of various countries on macroeconomic policies, and protecting the rights and interests and development space of each country. Full play should be given to the role of international organizations, such as the International Customs Organization, the International Maritime Organization, and the Universal Postal Union to establish an effective and regular communication and coordination mechanism, and jointly build flexible cross-regional supply chains.

The second is to strengthen multilateral, bilateral, and regional cooperation, continue to promote trade and investment liberalization and facilitation, reduce unreasonable restrictions on the flow of goods and factors, and guide enterprises in the region to expand the scale of trade and investment, thus building a more open and inclusive regional industry and supply chain system.

The third is to establish a coordination mechanism for major industries and fields, e.g. medicines, automobiles, and chips, create a benign cooperation environment, strike a balance between safety and efficiency, and let the market play a leading role in resource allocation, to avoid the industry and supply chains being artificially severed.