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ACHIEVEMENTS OF CHINA'S PORT CONSTRUCTION DURING THE YEARS OF REFORM AND OPENING UP

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Over the years of reform and opening up in China, China's foreign trade ports have become one of the foundations of China's 'economic miracle' and the foundation of modern China's national strength. China is the country with the highest degree of maritime communication in the world. This level of development is not the result of a coincidence, but the consequence of careful and strategic planning. Coastal ports are gateways to the outside world, centers of global resource distribution, and strategic fulcrums for global construction and the construction of the 'Belt and Road' and integration into the world economic system. The development of China's seaport system as a key connecting link of the land and sea Silk Road is acquiring increasing geo-economic meaning.

China's economic openness strategy has contributed to a significant increase in imports and exports. Growing demand inevitably leads to the rapid growth of the port industry and its innovative development. In particular, the development and improvement of the container port system has provided cost-effective and reliable transportation services for foreign trade. At the same time, coastal ports have played a key role in implementing international industrial supplies and becoming global production bases, and an important supporting role in shaping the country's all-round opening-up model. China's emergence as a great maritime power is becoming a fait accompli before our eyes. The overall scale of China's modern waterway infrastructure has become the largest in the world over the years of reform, and the capacity of waterway transport has been constantly improving.

Keywords: China, reforms, openness, port construction, periodization, dynamics, foreign trade

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ДОСТИЖЕНИЯ В ПОРТОВОМ СТРОИТЕЛЬСТВЕ КНР ЗА ГОДЫ РЕФОРМ И ОТКРЫТОСТИ

Н. К. Семенова

За годы реформ и открытости в Китае внешнеторговые порты КНР стали одной из основ китайского «экономического чуда» и фундаментом национальной мощи современного Китая. Китай является страной с самой высокой степенью морского сообщения в мире. Такой уровень развития — не результат случайного стечения обстоятельств, а следствие тщательного и стратегического планирования. Его прибрежные порты — это ворота во внешний мир, центры глобального распределения ресурсов и стратегические точки опоры для глобального строительства (в том числе «Пояса и пути») и интеграции в мировую экономическую систему.

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Развитие системы морских портов Китая как ключевого стыковочного звена сухопутного и морского Шелкового пути приобретает все больший геоэкономический смысл.

Стратегия экономической открытости Китая способствовала существенному росту импорта и экспорта. Рост спроса неизбежно приводит к быстрому росту портовой отрасли, ее инновационному развитию. В частности, развитие и совершенствование системы контейнерных портов обеспечило экономичные и надежные транспортные услуги для внешней торговли. В то же время прибрежные порты превратились в глобальные производственные базы и сыграли ключевую роль в осуществлении международных промышленных поставок, а также важную вспомогательную роль в формировании модели всесторонней открытости страны. Становление Китая как великой морской державы происходит на наших глазах. Общий масштаб современной инфраструктуры водного транспорта Китая стал за годы реформ самым большим в мире, а пропускная способность водного транспорта постоянно растет.

Ключевые слова: КНР, реформы, открытость, портовое строительство, периодизация, динамика, внешняя торговля

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The Third Plenary Session of the Eleventh Central Committee of the Communist Party of China (CPC) (1978) [Dahui shujuku, 1978] proposed the policy of reform and opening up, marking the end of the long-term closure of the Chinese economy. China seized the opportunity of the industrial upgrading of the 'Four Asian Tigers' and the secondary transfer of labor-intensive industries, began to participate in international industrial cooperation, and made great strides in the development of transportation. The scale of facilities expanded rapidly, the technical level improved significantly, and a powerful transportation system was formed. In terms of its ability to support economic and social development, China changed from an economically closed country to a country whose economy is heavily tied to foreign trade.

Change in the distribution of ports in China, 1978–2023

At the beginning of the reform and opening-up period, the original port system, including sea ports, already existed. Before 1978, there were 50 national first-class ports (sea, river, air, etc.) all over the country that were open to the outside world. Among them, water ports (sea and river) were concentrated mainly in the eastern coastal areas and along rivers, railway and automobile ports were along border areas, and airports were distributed only in six regional central cities. Due to the small number of entry ports (the function of entry ports is to connect the country's domestic and foreign markets, transport foreign trade goods, transport incoming and outgoing passengers, and promote foreign trade of cities in the interior — author's note) and uneven spatial distribution, China's foreign economic relations and foreign trade development were hampered (see Fig. 1).

At present, there are 150 first-class ports for foreign trade in the coastal area, more than six times the number in 1978. The coastal ports include ports in 11 provinces: Liaoning, Hebei, Tianjin, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Guangxi and Hainan (excluding river ports in Jiangsu and border ports in Liaoning and Guangxi) (see Fig. 1). The coastal areas have the most developed economy, the highest population density, the highest degree of openness in China, and the fastest growth rate.

The process of direct construction of ports in China can be divided into five periods. 1978 to 1984 (Period I), the initial stage — the pilot policy of open ports created a platform for foreign cooperation and

exchange. In Period I, mainly coastal and river ports were opened: 34 ports were opened (the total number: sea, river, air, etc. reached 84), including 22 coastal ports, which provided a platform for international cooperation. The average annual growth rate of foreign trade was 24.11% (see Fig. 2).

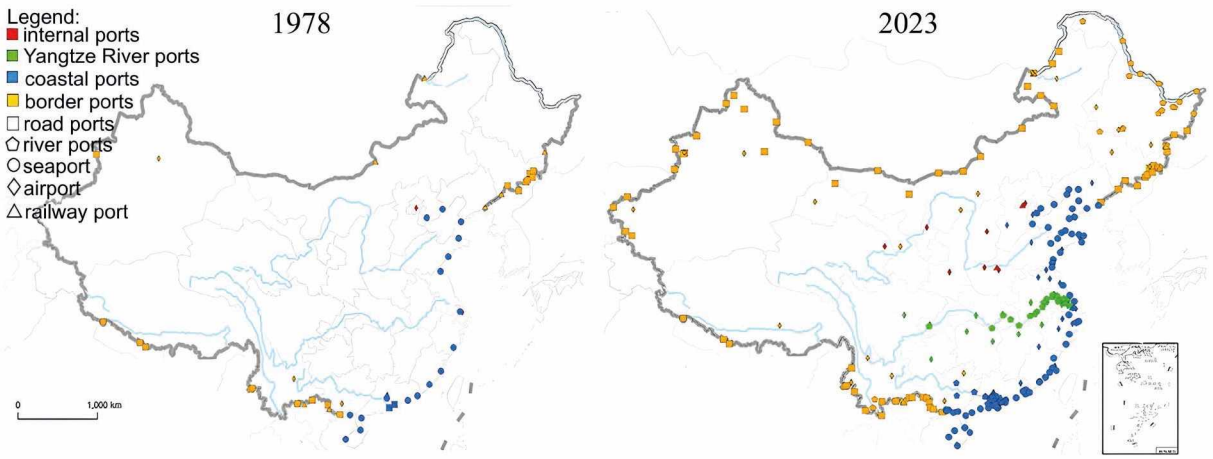

Figure 1. Change in the distribution of ports in China, 1978—2023

Source: [Xiaoshu Cao, Shengchao Li, 2019]

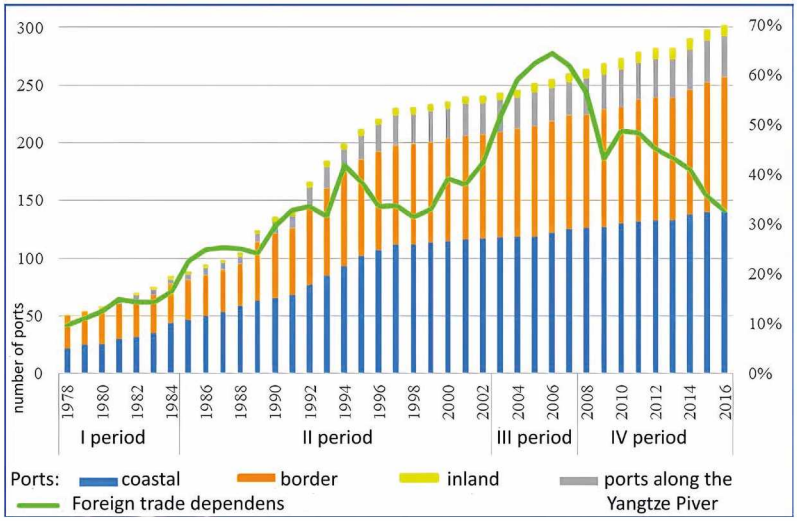

Figure 2. Dynamics of construction of ports in China in correlation with the growth of foreign trade from 1978 to the present (units, %)

Source: [Xiaoshu Cao, Shengchao Li, 2019]

1985 to 2002 (Period II) — the period of 'expansion', the influx of foreign capital and the opening of ports contributed to the constant optimization of the structure of foreign trade. In the second period, there is a rapid growth of border ports, a total of 157 new ports were opened, their total number reached 241. At the same time, the average annual growth rate of foreign trade is 24.71% (see Fig. 2).

2003–2007 (Period III) — the period of 'cooperation', the opening of ports corresponded to the adjustment of the general industrial structure of China. China's entry into the WTO contributed to the modernization of the country's industrial structure, the revival of old industrial bases in the northeast

and the development of the western region of China began. But at the same time, in the III period there is a slight slowdown in the overall growth rate. China's foreign trade had an average annual growth rate of 26.81%, 19 ports were opened, as a result of which the total number of ports reached 260 (see Fig. 2).

2008 to 2016 (Period IV) is the 'optimization' period, characterized by comprehensive opening-up. The opening of ports provided guarantees for the implementation of the national development strategy [Xiaoshu Cao, Shengchao Li, 2019] and the implementation of the initiatives: "Silk Road Economic Belt" and '21st Century Maritime Silk Road, as well as the 'Yangtze River Economic Belt. In Period IV, the number of ports in each region steadily increased, 42 new ports were opened (the total number reached 302). The average annual growth rate of foreign trade slowed to 5.12% against the high base of previous periods (see Fig. 2).

From 2017 to the present (Period V), a new stage has begun, aimed at improving the quality of port construction. With the help of the created unique port structure, the regional comprehensive economic partnership is strengthened, and an experiment is being implemented to create a free trade port. Chinese ports are intelligent and environmentally friendly.

Modern port structure of China

Currently, China has more seaports than any other country: about 2,000 sea, river and other ports (150 coastal ports), 130 of which are open to foreign ships, 34 large ports (coastal and inland river ports) with a cargo turnover of more than 100 million tons in mainland China, 22 of which are coastal. 8 of the 10 busiest ports in the world are in China. The volume of imports of seaborne transportation of the PRC is 1/4 of the world total.

According to the National Coastal Port Layout Plan [Jiaotong Yunshubu, 2007] of 2006 and from the perspective of regional planning, the seaports were grouped into five port clusters: Bohai Economic Circle, Yangtze River Delta, Southeast Coastal Port Cluster, Pearl River Delta and Southwest Coastal Port Cluster, which include 7 multi-port gateway regions: Liaoning, Tianjin-Hebei, Shandong, Yangtze River Delta, Southeast, Pearl River Delta, Southwest.

Such grouping produces an agglomeration effect, which contributes to the rational distribution of productive forces, adjustment and optimization of the industrial structure: adaptation to the requirements of the layout of electric power, metallurgy, petrochemistry, processing and other industries.

The port system of the PRC has its own unique features and characteristics:

- the formation and development of port groups around the above-mentioned five major regions promotes rational distribution of productivity, adjustment and optimization of industrial structure, development of international economic cooperation and competition;
- the economy of hinterland regions is of decisive importance for the ports of the PRC: the spatial economic structure and its changes affect the direction of construction of port facilities, and the industrial structure determines the structure of the port capacity, which in turn leads to the fact that port enterprises have differences in the level of profitability;
- the system of coastal ports of China is gradually moving from centralized development to a decentralized development model with multi-port competition, the integration of ports at the provincial level is a means of reducing fierce competition between regional ports;
- public investment is gradually leaving the sphere of port operation, investment structures are diversifying;
- the construction and operation of ports have entered the stage of independent adjustment and development in response to changes in market demand;
- the development of port infrastructure shows a tendency towards large-scale and intelligent.

Despite all the successes of port construction, the port industry of the PRC is not free from the influence of some negative trends formed due to objective and subjective reasons. Namely, the cargo turnover of ports has switched from high-speed growth to medium- and low-speed growth: in the period 1978–1999 the average annual growth rate of cargo turnover was about 35%, in 2000–2010 the average growth rate of cargo turnover of coastal ports reached 15.9%, in 2011–2015 it decreased to 7.4%, in 2016–2018– to 5.5%, 2019–2021–5.6% [Calculated by the author based on: Jiaotong yunshubu, 2022]. This phenomenon can be considered quite justified and is explained by the low base effect, which is observed in new, rapidly developing sectors of the economy at the initial stage of reforms.

Intensive port construction, as can be seen, was carried out with a large margin of safety, for the future. The consequence of which, today, is a structural excess of capacity in the port and related industries of the PRC. In combination with the high capital intensity of the port economy and the slowdown in the growth rate of profitability of port assets, excess capacity becomes an additional burden on the industry. To compensate for such phenomena, the following is carried out: reorganization, modernization and enlargement of port berths in the ports of the PRC, structural changes in water transport and industry equipment to save money due to the effect of scale of terminals, large-scale and specialization of ships [Semenova, 2023, pp. 152–153].

The existing regional imbalance in container transportation (key routes rely on eight main container trunk ports) and the dominance of foreign trade routes in the structure of container routes in recent years have been offset by significant growth in domestic trade routes due to the implementation of the "dual circulation" strategy, which implies a shift in the main driver of China's sustainable growth from global integration to greater reliance on the domestic market [Salitsky, Semenova, 2021, pp. 161–173].

Foreign Trade as an Engine of China's Economic Growth

During the 45 years of reform and opening up, China's national economy grew at an average annual rate of 9%, the total volume of foreign trade imports and exports increased by more than 300 times (in US dollars), and the cargo throughput of ports increased by nearly 60 times (see Fig. 3).

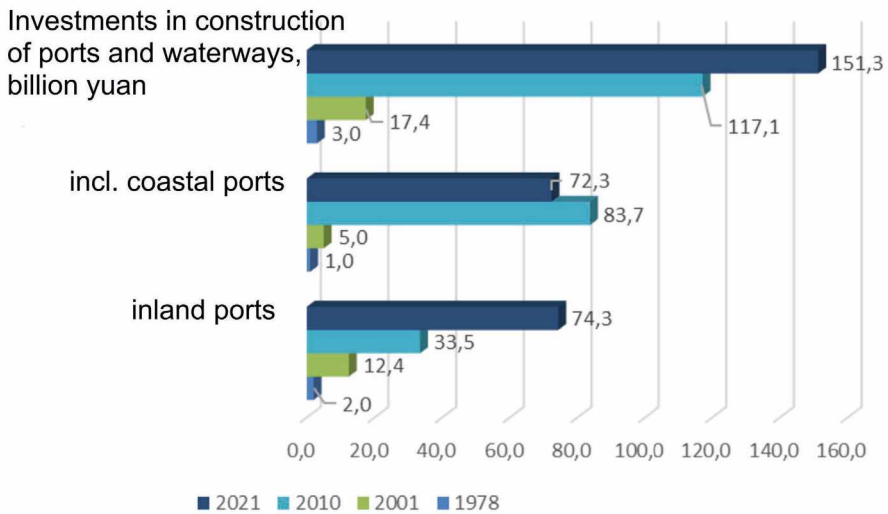

Figure 3. Investment in the construction of ports and waterways of the PRC, including coastal and inland ports, 1978—2021 (billion yuan)

Sources: compiled by the author based on [Xinlang caijing 2002; Jiaotong yunshubu, 2010; Gujjia tjngji ju, 2018; Zhongguo zhengfu, 2022].

In 1978, China's port cargo throughput was 280 million tons (10 million tons in 1949), and China's total import and export volume of goods was $20.6 billion [Jiaotong yunshubu, 2023], ranking 32nd in world merchandise trade, accounting for less than 1% [Jiaotong yunshubu, 2023].

By the end of 2023, the cargo turnover of China's ports is about 16 billion tons, the total volume of import and export of goods in China is about 6 trillion US dollars, of which exports are 3.4 trillion dollars, and imports are 2.6 trillion dollars [Zhongguo wu liu, 2024]. The growth rate of the indicators of the port and related industries of China is unique: the cargo turnover of ports has increased almost 60 times, including the growth of cargo turnover of coastal ports has increased 50 times, and inland ports — 70 times. Before the beginning of the period of reform and opening up in the PRC, there was no container transportation. Currently, China is the world leader in the scale container ports and container transportation (see Table 1).

Table 1. Cargo turnover, volume of external cargo, including by type, container turnover of PRC ports and growth rates, 1978–2021 (million tons, billion tons, million TEU, %)

Indicator	1978	2001	2010	2021	Average annual growth rate, %			Total increase, %		
					1978/ 2021	2001/ 2021	2010/ 2021	1978/ 2021	2001/ 2021	2010/ 2021
Cargo turnover of ports (million tons):	**280**	**2400**	**8932**	**15545**	**127**	**26**	**6**	**5452**	**548**	**74**
including internal ports	80	950	3288	5573	160	23	6	6866	487	69
coastal ports	200	1450	5645	9973	114	28	6	4887	588	77
Foreign trade cargoes (billion tons):	-	**660**	**2501**	**4697**	-	**29**	**7**	-	**612**	**88**
including domestic ports	-	60	213	509	-	36	12	-	748	139
coastal ports	-	600	2288	4188	-	28	7	-	598	83
Cargo turnover by type of cargo (billion										
coal and products	-	0,45	1,65	2,831	-	25	6	-	529	72
oil,natural gas and products	-	0,31	0,71	1,316	-	15	7	-	325	85
metal ore	-	0,2	1,26	2,399	-	52	7	-	1100	90
mining and construction.mat.	-	0,19	1,2	-	-	-	-	-	-	-
steel	-	0,08	0,39	-	-	-	-	-	-	-
Container turnover (million TEU),	**0**	**27,5**	**146**	**282,7**	-	**44**	**8**	-	**929**	**94**
including internal ports	0	2,79	14,7	33,4	-	52	11	-	1097	128
coastal ports	0	24,7	131	249,3	-	43	8	-	909	90

Sources: compiled by the author based on [Xinlang caijing 2002; Jiaotong yunshubu, 2010; Gujjia tjngji ju, 2018; Zhongguo zhengfu, 2022].

Over the period 2000–2020, the growth in the throughput capacity of Chinese ports (excluding Hong Kong and Taiwan) was 498%, i. e. the average annual growth in container turnover (AACG) of Chinese ports was 23.71%, which is the second result in the EA region. Vietnam took first place in terms of growth in port throughput (+944% for 2000–2020).

China's leadership in the port industry in some areas is practically unattainable for competitors not only regional but also global [Semenova, 2023, pp. 48–49]. Since 1978, the cargo turnover of water transport in China and the total number of berths have increased 30-fold, the number of berths with a capacity of 10,000 tons or more has increased almost 20-fold, the volume of commercial cargo in foreign trade has increased more than 200-fold, including sea transport more than 100-fold (see Table 2).

Table 2. Number of berths, volume of commercial cargo, cargo turnover of ports of the PRC and growth rates, 1978-2021 (units, billion tons, billion t-km, %)

Indicator	1978	2001	2010	2021	Average annual growth rate, %			Total increase, %		
					1978/ 2021	2001/ 2021	2010/ 2021	1978/ 2021	2001/ 2021	2010/ 2021
Number of berths	735	33 441	31 634	20 867	64	-2	-3	2739	-38	-34
incl. 10 thousand tons and more	133	810	1661	2659	44	11	5	1899	228	60
Volume of commercial cargo (billion tons):	-	**1,33**	**3,789**	**8,24**	-	**25**	**10**	-	**520**	**117**
incl. inland waterway transportation	-	1,049	3,209	4,189	-	14	3	-	299	31
marine transportation	0,04	0,28	0,581	4,051	252	64	50	10849	1347	597
Executed cargo turnover (billion t-km):	**378**	**2599**	**6843**	**11558**	**69**	**16**	**6**	**2958**	**345**	**69**
incl. inland waterway transportation	129	545,8	2243	1774	30	11	-2	1273	225	-21
marine transportation	249	2053	4600	9784	89	18	9	3834	377	113

Sources: compiled by the author based on [Xinlang caijing 2002; Jiaotong yunshubu, 2010; Gujjia tjngji ju, 2018; Zhongguo zhengfu, 2022]

Investments in port development and waterway construction have increased more than 50-fold. And if after China's accession to the WTO in 2001 coastal ports were an investment priority, now investment indicators for inland and coastal ports have almost reached parity with a slight advantage for inland ports. State investments are gradually leaving the port operation sphere, investment structures are diversifying (see Fig. 3).

Water transport indicators in terms of the number of ships and their carrying capacity over the period show opposite trends: with a decrease in the number of ships, their carrying capacity increased more than 16 times (see Fig. 4).

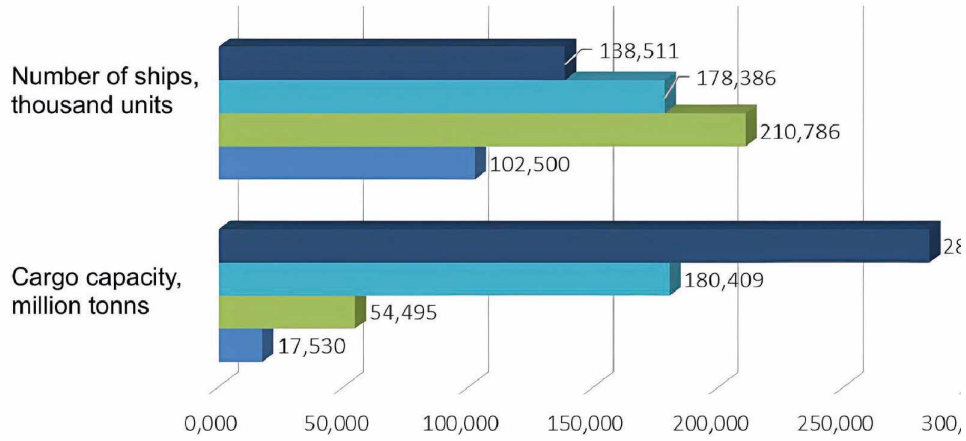

Figure 4. Ratio of ship construction in China to their cargo capacity, 1978—2021 (thousand units, million tons).

Sources: compiled by the author based on [Xinlang caijing 2002; Jiaotong yunshubu, 2010; Gujjia tjngji ju, 2018; Zhongguo zhengfu, 2022]

At the same time, as the goals of port construction are achieved, a decrease in the average annual growth rate is observed in both investment and shipbuilding. The average annual growth rate of investment in the construction of ports and waterways in China for the period 1978–2021 was 115%. Average annual growth rates for shipbuilding show that the leader in this option is the construction of a container fleet, with average annual growth rates of 56% for the period 1978–2021 (see Table 3).

Table 3. Natural indicators of China's investment in the construction of ports and waterways (billion yuan), dynamics of shipbuilding (units) and growth rates, 1978—2021 (%)

Indicator	1978	2001	2010	2021	Average annual growth rate, %			Total increase, %		
					1978/ 2021	2001/ 2021	2010/ 2021	1978/ 2021	2001/ 2021	2010/ 2021
Investments in construction of ports and waterways, billion yuan:	**3**	**17,4**	**117**	**151**	**115**	**37**	**2**	**4943**	**770**	**29**
including inland ports	-	12,4	33,5	74,3	-	24	10	-	499	122
coastal ports	-	5	83,7	72,3	-	64	-1	-	1346	-14
Number of ships, thousand units	**103**	**211**	**178**	**139**	**1**	**-2**	**-2**	**35**	**-34**	**-22**
Cargo capacity, million tons	17,5	54,5	180	284	35	20	5	1522	422	58
Passenger capacity, million passengers	-	1,08	1	0,86	-	-1	-1	-	-20	-15
Container capacity, million TEU	0,12	0,51	1,33	2,89	56	22	10	2409	470	118

Sources: compiled by the author based on [Xinlang caijing, 2002; Jiaotong yunshubu, 2010; Gujjia tjngji ju, 2018; Zhongguo zhengfu, 2022]

Ports play a key role in the implementation of international industrial supplies of the PRC (95%) and are turning into global production bases. The throughput capacity of the port industry is mainly provided by the commodity flow of coal, oil, metal ore (more than 50%), containers, etc. In 2023, the volume of ore imports amounted to 1460 million tons, and almost three quarters of the supplies are from Australia and Brazil, namely 780.4 million tons (+ 1.2% compared to 2022) and 252 million tons (+ 10.4%) [Zhonghua renmin..., 2024]. Also on the list of ore exporters are countries from Africa, South Asia and Latin America. It should be noted that in Brazil and African countries, ore raw materials are mined by companies with Chinese capital.

Oil cargo is in second place in the import rating for 2023 (748.5 million tons), where the leading position in individual deliveries is occupied by Russia with an indicator of 131.3 million tons (32.1% compared to 2022) [Zhonghua renmin..., 2024]. The second and third places in terms of supply volumes are occupied by Malaysia and Saudi Arabia with almost similar indicators of 90.7 million tons (+41.4% compared to 2022) and 88.6 million tons (–1.1%), respectively. Iraq is in fourth place (about 60 million tons, +7% compared to 2022). Russia's share in oil imports to China amounted to about 18% in 2023. The Middle East region ended the year with a share of oil deliveries of about 33% [Zhonghua renmin..., 2024].

The demand for cargo transportation is closely related to the macroeconomic situation, while the demand for container transportation is mainly related to the prosperity of foreign trade. International macroeconomic fluctuations can also affect its volume. It can be concluded from this that the port industry is a cyclical industry and is closely related to the global and domestic economic situation. In addition, port enterprises are involved in many upstream and downstream industries, and factors such as the prosperity and cyclical changes of related industries will affect the operations of port enterprises, as there is an obvious correlation between China's GDP, the growth of imports and exports, and the throughput of ports (see Fig. 5).

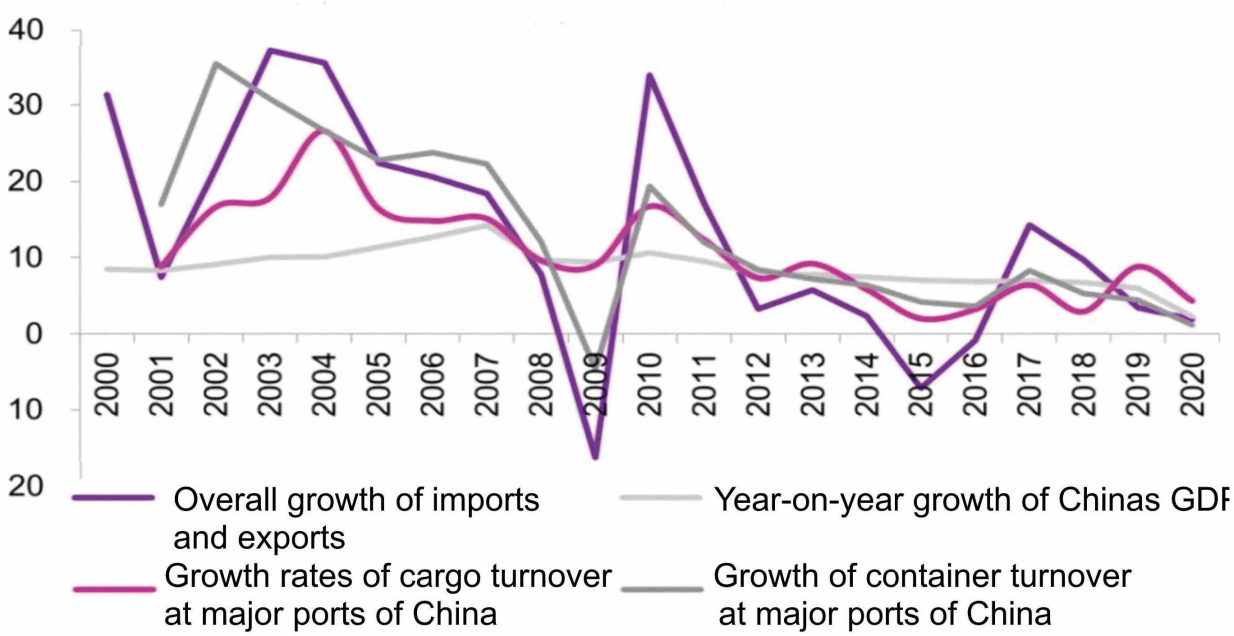

Figure 5. Correlation between China's GDP, import and export growth, and port throughput, 2000–2020 (%)

Source: [Zhou Yue, 2020]

After entering the 21st century, China's economy developed rapidly (see Fig. 5): the average annual GDP growth rate reached 9.8% during the 10th Five-Year Plan period, and 11.2% during the 11th Five-Year Plan period. During the 12th and 13th Five-Year Plan periods, China gradually moved from the industrialization stage to the middle and late stages of industrialization. The economic development mode changed from high-speed to high-quality, GDP growth slowed down, and the growth rate of freight traffic gradually decreased. In 2020, the volume of freight transportation by water was 76.2 million tons, 16.1% (road, rail, air and pipeline transport amounted to 342.6, 45.5, 0.1 and 860 million tons, respectively, which amounted to 72.4%, 9.6%, 0.1% and 1.8%, respectively) [Lu Chen, Lei Yu, Cai Bofeng, at all., 2022, pp. 9–15].

From the perspective of industrial and macroeconomic correlation, China's GDP growth rate and overall import and export trade growth have shown a declining trend in recent years: the GDP growth rate dropped from 10.64% in 2010 to 6.11% in 2019, the total import and export reached the lowest value of –7.00% in 2015 and then began to recover, the cargo throughput and container throughput of China's major ports reached the minimum values of 2% and 3.6% in 2015–2016, respectively, and then slightly recovered.

Import is the key node connecting the domestic and international cycles [Wei Hao, Yang Mingming, 2022]. Actively expanding imports is aimed at improving the interconnection of the domestic market, making more efficient use of the international market, and attracting global resources. Thus, an important strategic path of the double cycle is achieved [Salitsky, Semenova, 2021, pp. 161–173] at the domestic and international levels.

Chinese ports are of crucial importance to the development of global trade, and their outstanding achievements in development are mainly due to the following reasons [Zhongguo gangkou..., 2023, p.10]: firstly, the rapid development of foreign trade has generated huge market demand for port business; secondly, the government attaches great importance to the upgrading of the port industry and provides strong policy support; thirdly, it is the extensive international economic cooperation that has put forward higher requirements for improving the quality of port services, such as the joint construction of the Belt and Road Initiative (BRI) and the accession to the Regional Comprehensive Economic Partnership (RCEP) [Quyu quanmian...].

Conclusion

Until the 1950s, China's ports were merely a link between maritime and inland shipping. They were generally isolated from shipping and trading activities outside the port area. They rarely cooperated with local governments and did not communicate with each other. China's port industry was unable to cope with the demands of the times, and current problems hampered the growth of port trade turnover.

In the little over 45 years since the start of reforms and opening up of the economic structure of the PRC, the construction and development of ports have become important factors influencing the competitiveness of cities and regions. During this time, the country's port industry has been completely transformed: illegitimate and outdated port facilities have been virtually eliminated, ports have been linked to inland areas by a dense network of multimodal routes, port groups have been structured, a new management and investment system has been introduced, etc. Such a large-scale reorganization has brought its positive results, but the new port system is also not free from problems, in particular excess capacity, duplication of terminals, insufficient integration of ports, etc. The leadership of the PRC and provinces continues to establish a complex mechanism for the functioning of the country's port economy. With the continuous development of regional economic integration and 'dual circulation', ports, as hubs of water

and land transportation, as well as 'bridgeheads' and 'main engines' of urban opening and development, will continue to play an important role in promoting regional economic development and the overall Chinese economy.

A well-thought-out strategy for attracting investment and the advantages of a planned economy have enabled China to achieve an unrivaled level of port infrastructure development in a short period of time, within the life of one generation. The port economy has become one of the important components of China's modern industrial system and its competitive advantage.

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