

Current Chinese Economic Report Series

Jian-hua Xiao · Shao-ju Lee
Bing-lian Liu · Jun Liu *Editors*

Contemporary Logistics in China

Collaboration and Reciprocation

 Springer

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Chapter 1

Development of China's Logistics Market



Xiao-Mei Jiang

Year 2016 marked the first year in the 13th Five-year Plan for Economic and Social Development in China. In 2016, the global economic outlook was still gloomy and trade protectionism continued to intensify. Downward pressure on China's economy had heightened and structural imbalance in the economy had become more pronounced. As a result, China's Government had adopted the supply-side structural reform and the innovation-driven strategy, which not only helped secure steady growth of China's economy, but also accelerated the new driving force for the economic growth in the country.

In 2016, major characteristics of China's logistics market were manifested in five areas: (1) Demand structure for logistics continued to adjust, growth rates of logistics demands in mining industry and other high-energy-consuming industries slowed down noticeably, and logistics demands of cold chain, pharmaceutical products, e-commerce, and within-the-city prompt delivery grew rapidly; (2) "Internet + efficient logistics" developed swiftly while the level of intelligent operations in warehousing, transportation and distribution was elevated; (3) Resource integration was deepened via regrouping of enterprises, IPO, VC, alliance building and M&A; (4) Logistics enterprises continued to improve the "Belt and Road" logistics and cross-border e-commerce logistics system; (5) New progress was made in green logistics.

This chapter contains three sections. Section 1.1 introduces the development environment of the domestic and global logistics industry for China in 2016. Section 1.2 describes the indicators for the general status of China's logistics market for 2016, including total value of social logistics, total expense of social logistics, freight volume and freight turnover, cargo throughput and container throughput of port, and business volume of express delivery industry. Section 1.3 summarizes the major development characteristics of China's logistics market.

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1.1 Environment for China's Logistics Development

1.1.1 Sluggish Growth of World Economy and Trade

1.1.1.1 Continued Slow Growth of World Economy

In 2016, world economy was still mired in the period of intense adjustment, continuing the momentum of low-speed growth. The IMF predicted that the world economy would grow at 3.1%, the same rate as the previous year. Average growth rate in Advanced Economies would decline to 1.6% from the 1.9% of the previous year. Average growth rate in the Emerging Markets and Developing Economies would reach 4.1%, rising slightly from that of the previous year. Table 1.1 shows the economic growth of major economies in the world for 2012–2016.

1.1.1.2 Growth of Global Trade Slowed Down Evidently

In 2016, growth rate of global trade volume slid evidently. The WTO report indicated that world merchandise trade volume grew by mere 1.3%, hitting the record low since the 2008 global financial crisis, and dropped by 1.3% points year-on-year. This is mainly attributed to the considerable fall of the trade growth in the

Table 1.1 Economic growth of major economies in the world for 2012–2016 (%)

	2012	2013	2014	2015	2016
World economic growth	3.2	3.0	3.3	3.1	3.1
Developed economies	1.3	1.3	1.8	1.9	1.6
United States	2.3	1.9	2.4	2.5	1.6
Euro zone	−0.4	−0.4	0.8	1.5	1.7
Japan	2.0	1.7	0.1	0.6	0.9
Emerging markets and developing economies	5.1	4.7	4.4	4.0	4.1
China	7.8	7.7	7.4	6.9	6.7
Russia	3.6	1.5	0.6	−3.7	−0.6
India	4.5	4.4	7.3	7.3	6.6
Brazil	1.0	2.3	0.1	−3.8	−3.5
South Africa	2.3	1.8	1.4	1.3	0.3

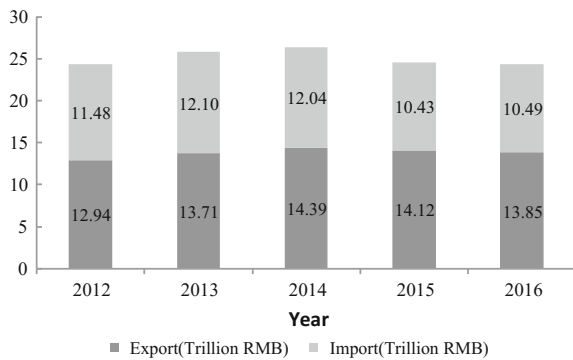
Source Compiled from the *World Economic Outlook* (Jan. 2013, Jan. 2014, Jan. 2015, Jan. 2016, Jan. 2017), published by IMF

Table 1.2 Growth rate of world trade for 2012–2016 (%)

	2012	2013	2014	2015	2016
Volume of world merchandise trade	2.2	2.4	2.7	2.6	1.3
Export: developed economies	1.1	1.7	2.4	2.7	1.4
Developing and emerging economies	3.7	4.0	3.0	2.0	1.3
Import: developed economies	0.0	0.0	3.6	4.7	2.0
Developing and emerging economies	4.9	4.6	1.7	0.5	0.2

Source Data for 2012 are compiled from the World Trade Report (2015); data for 2013–2016 are from the report “Trade recovery expected in 2017 and 2018, amid policy uncertainty,” both reports published by the WTO

Fig. 1.1 China's total value of import and export for 2012–2016. Source Compiled from the China Statistical Bulletin of National Economic and Social Development (2016), published by the National Bureau of Statistics of China



Emerging Markets, amounting to almost zero growth. Other factors contributing to this decline include the cyclical slowdown of world economic activities, reduction of the US investments and China's economic transformation from investment-driven to consumption-driven. Table 1.2 shows the growth rate of world trade for 2012–2016.

In 2016, foreign trade in China recorded a negative growth, with total volume of merchandise trade standing at 24.34 trillion RMB, falling by 0.9% year-on-year. The export value reached 13.85 trillion RMB, dropping by 1.9% year-on-year; import value stood at 10.49 trillion RMB, rising by 0.6% year-on-year. Figure 1.1 shows China's total value of import and export for 2012–2016.

1.1.1.3 Trade Protectionism Intensified

In 2016, the shrinking demands caused by global economic slowdown triggered the trade competition and protectionism among world's nations. Brexit and outcome of the US election also impacted the multilateral trade systems. According to the WTO statistics, from October 2015 to May 2016, G20 member countries added 145 trade restriction measures, meaning that an average of 12 measures were taken per month, which rose considerably year-on-year. In 2016, monthly number of trade remedy investigations initiated by WTO members against China reached the apex since 2009; in 2016, 27 countries (regions) initiated 117 trade remedy investigations against China, averaging one investigation every three days, with a total worth 13.98 billion USD. The number of investigations and value went up by 34.5 and 71.5%, respectively, year-on-year (Wu 2016).

Confronted with challenges of various trade protectionisms, China's Government, in 2016, reiterated its firm position against trade and investment protectionism in the multilateral cooperation mechanisms of G20 and APEC. It also promised that China, as the world's second largest economy, would continue to function in the leading role and as the driving force to promote the global value chain featuring tolerance and coordination, to support multilateral trade system and release the global potential for economic and trade cooperation, so as to curb the sliding trend in global trade growth.

1.1.2 China's Economy Maintained Steady Growth

1.1.2.1 Medium-High Growth Rate of China's Economy

In 2016, China's GDP amounted to 74.41 trillion RMB, growing by 6.7% as calculated in constant price. The growth rate was slightly lower than that of the previous year. Figure 1.2 shows China's GDP and growth rate for 2006–2016.

1.1.2.2 Economic Structure Continued to Optimize

In terms of demand structure, China has entered a new phase featuring continual expansion of consumption, accelerated upgrading of consumption structure, and larger contribution to GDP made by consumption. Consumption has become the largest stimulus of economic growth. According to statistics by the Ministry of Commerce of China, in 2016, total amount of retail sales of consumer goods reached 33.23 trillion RMB, rising by 10.4% year-on-year. Total amount of online sales reached 5.16 trillion RMB, rising by 26.2% year-on-year. Consumption contributed 64.6% to GDP growth in 2016, rising by 4.7% points from that of the previous year.

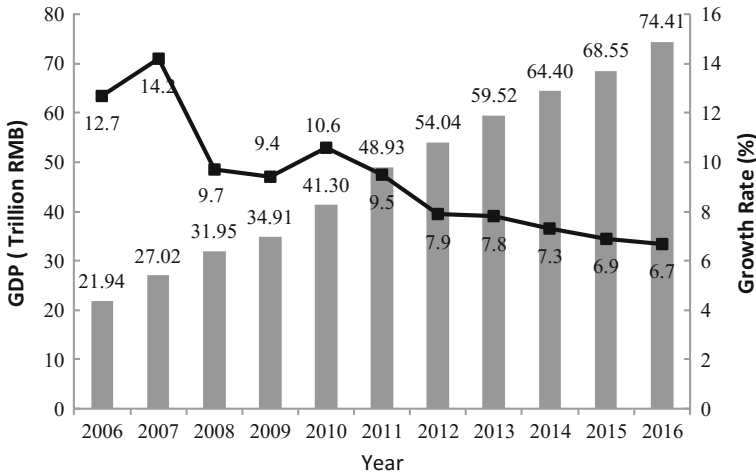


Fig. 1.2 China's GDP and growth rate for 2006–2016. *Note* GDPs are computed per current price of each year; growth rates are computed based on constant price of the same base year. *Source* Compiled from the China Statistical Yearbook (2016), and the China Statistical Bulletin of National Economic and Social Development (2016), both published by the National Bureau of Statistics of China

In terms of industrial structure, the proportion of service industry continued to rise, while the internal structure of manufacturing industry continued to optimize. In 2016, added value in service industry increased by 7.8% from the previous year; the proportion of added value of service industry in GDP rose to 51.6%, or 1.4% points higher than that of the previous year. Growth rates in high-tech industries and equipment manufacturing industry stood at 10.8 and 9.5%, respectively, both much higher than the growth rate of general manufacturing industry. Figure 1.3 shows the proportions of added values of the three industries in GDP for 2006–2016.

1.1.3 Government's Efforts in Supply-Side Structural Reform and the Innovation-Driven Strategy

1.1.3.1 Supply-Side Structural Reform

In November 2015, to resolve the problems of imbalance between supply and demand in China's economy and supply-side adjustments evidently lagging behind demand-side changes, China's Government announced that it would "enhance the supply-side structural reform while aptly expanding the aggregate demand". By making supply-side structural reform, the Government intended to enhance the flexibility and adaptability of supply to demand changes, reduce ineffective and low-end supplies,

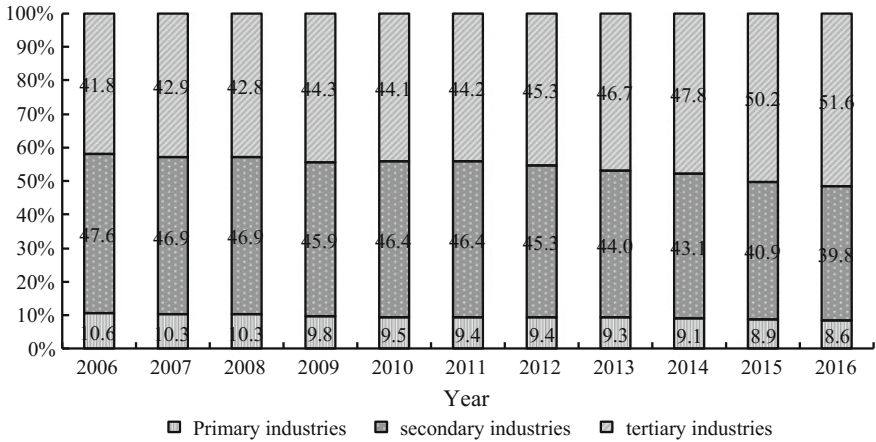


Fig. 1.3 Proportions of added values of the three industries in GDP for 2006–2016. *Source* Compiled from the China Statistical Yearbook (2016), and the China Statistical Bulletin of National Economic and Social Development (2016), both published by the National Bureau of Statistics of China

and expand effective and medium-and-high-end supplies, thus securing the medium- and long-term healthy growth of China’s economy.

The supply-side structural reform in 2016 had five major tasks, namely, cutting excess capacity, destocking property inventory, deleveraging corporate operations, relieving corporate burdens, and improving weak links.

By the end of 2016, some positive results had been made in supply-side reform. For example, China cut iron and steel yearly production capacity by more than 6.5 million tons, and annual coal capacity by over 290 million tons. Also in 2016, the country cut taxes by more than 570 billion RMB while reducing labor cost, capital cost and electricity cost for enterprises. By making supply-side structural reform, China boosted the market expectations and confidence. Since the second half of 2016, a number of active changes have emerged in China’s economy. Production deflation is markedly alleviated, prices of iron and steel and coal are lifted up, profits of industrial enterprises have improved, and the growth rate of fixed-assets investments remains stable.

1.1.3.2 The Innovation-Driven Strategy

The “Made in China 2025” strategy had made notable progress. In 2016, the Ministry of Industry and Information Technology of China built the National Innovation Cen-

ter for Power Battery and 19 provincial-level innovation centers for manufacturing industry, and chose 109 demonstration pilot test projects for intelligent manufacturing. Since the strategy was put into effect one year ago, it has, first of all, attained a number of innovation results in high-end equipment. For instance, major breakthroughs have been made in key high-speed railway technologies and supporting technologies; China has succeeded in developing its first flexible hybrid industrial robot. Secondly, it has helped China's manufacturing industry improve its level of digitized, networked and intelligent development. According to statistics by the Ministry of Industry and Information Technology of China, by the end of 2016, the penetration rate of digitized R&D instruments in China had reached 61.8%; 38.2% of digitized production equipment in industrial enterprises had been networked; the rate of digital-controlled key production process had reached 33.3%.

Vigorous innovations has been made in "Internet+". In the field of manufacturing, the Haier Group, a large manufacturer of home appliances, has built an open innovation platform to facilitate real-time interactions with global experts and users. Presently, this platform has gathered up more than 100,000 innovation resources, thus considerably improving Haier's R&D efficiency. JD.com, the giant e-commerce retailer, uses big-data technology to analyze customers' purchase preferences to assist Lenovo Group Ltd., the famous IT manufacturer, make product design and sales predictions. Large engineering machinery manufacturers XCMG and SANY HEAVY INDUSTRY CO., LTD., by using IoT technologies, provide remote product monitoring, diagnosis and maintenance services, so as to transform themselves into a service-oriented manufacturer. In the field of service industry, "Internet+" developed rapidly, prompting a number of new models of sharing economy and innovative enterprises with great influence. Notable examples include xiaojukeji.com in the travel field, mayi.com in the short-term renting area, guahao.com in the medical field, linjia.me in the livelihood field, imdada.cn in the logistics industry, and zbj.com in the knowledge field. In 2016, transaction value in the sharing economy reached 3.45 trillion RMB, rising by 103% from the previous year (National Information Center 2017).

1.1.4 China Persisted with the High-Level Opening-up

1.1.4.1 The "Belt and Road" Initiative Steered Cooperation with Foreign Countries

In 2016, China joined hands with countries along the "Belt and Road" routes to push forward the "Belt and Road" Initiative, which steered China's cooperation and opening to the outside world. First, there was the positive momentum of trade and

investments between China and countries along the “Belt and Road” routes. Statistics of the Ministry of Commerce revealed that in 2016, the total values of trade between countries along the “Belt and Road” routes and China amounted to 6.3 trillion RMB, rising by 0.6% year-on-year. By the end of 2016, China’s enterprises had initially established 56 cooperation zones in countries along the “Belt and Road” routes, which attracted 1082 enterprises residing in them with total output of 50.69 billion USD. Second, China sped up its cooperation with these countries in infrastructure construction. Phase II of Karakoram Highway in Pakistan and Karachi Highway have commenced construction; Phase II of China-Tajikistan Highway, the Central Asia Natural Gas Pipeline D, the Moscow-Kazan High-speed Railway, and the China-Thailand Railway are being built. These projects have effectively improved the level of infrastructures in countries along the “Belt and Road.”

1.1.4.2 Pilot Free Trade Zone Expanded Considerably

In 2016, China established another seven Pilot Free Trade Zones in Liaoning Province, Zhejiang Province, Henan Province, Hubei Province, Chongqing Municipality, Sichuan Province, and Shaanxi Province. These were the third batch of Pilot FTZs succeeding those in Shanghai, Tianjin, Guangzhou and Fujian. The new Pilot FTZs would adopt the rules and norms of international economy and trade so as to promote reforms and open China wider to the outside world. In addition, among the seven new Pilot FTZs, two are located in the Eastern region and Northeastern region; the other five are located in the Central region or Western region, signifying that China is more committed to the opening-up and development of these inland regions.

1.1.4.3 Investments in Foreign Countries Grew Rapidly

In 2016, China’s investment in foreign countries increased rapidly. According to the statistics of the Ministry of Commerce, China’s investors made nonfinancial direct investments in 7961 overseas enterprises in 164 countries and regions, totaling 1.13 trillion RMB, rising by 44.1% year-on-year. Meanwhile, China continued to optimize the industrial structure of investments made in overseas countries, focusing more on substantive economy and emerging industries. The proportion of investments in manufacturing industry in total investments in foreign countries rose from 12.1% in 2015 to 18.3% in 2016; the proportion of investments in information transmission, software and IT service industry rose from 4.9% in 2015 to 12.0% in 2016.

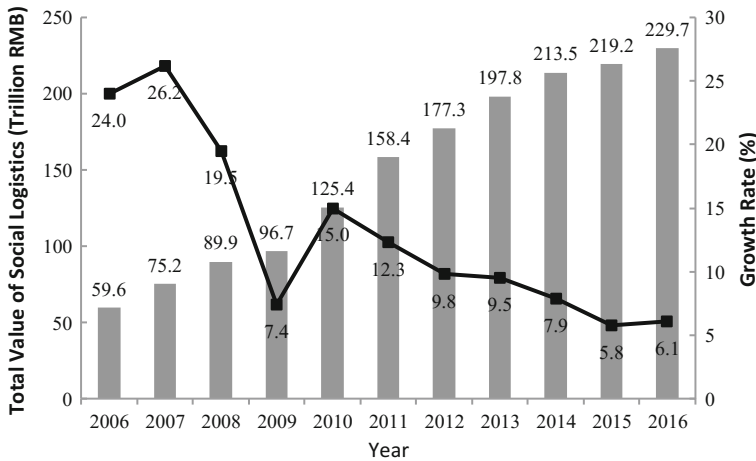


Fig. 1.4 Total value and growth rate of social logistics for 2006–2016. *Note* Growth rates for 2006–2009 are nominal growth rates; that for 2010–2016 are real growth rates. *Source* Compiled from the National Logistics Operations Bulletin for 2006–2016, published by the National Development and Reform Commission, the National Bureau of Statistics, and the China Federation of Logistics and Purchasing

1.2 Overall Scale of China's Logistics Market

1.2.1 Total Value of Social Logistics¹

In 2016, total value of social logistics amounted to 229.7 trillion RMB, equaling to a growth rate of 6.1% calculated in constant price; this growth rate is 0.3% points higher than that of the previous year. Figure 1.4 shows the total value and the growth rate of social logistics for 2006–2016. Table 1.3 shows the composition of total value of social logistics for 2012–2016.

¹Total value of social logistics is composed of five parts: ① Total value of commodities of farming, forestry, animal husbandry and fishing products in social logistics field (“Total Logistics amount of agricultural products” for short); ② Total value of commodities of industrial products in social logistics field (“total logistics amount of industrial products” for short); ③ Total logistics value of import goods; ④ Total value of commodities of renewable resources in social logistics field (“total logistics amount of renewable resources” for short); ⑤ Logistics value of goods from institutes and residents (including luggage in railway and air transport, parcels and letters in mailing service, various donations from all sectors of the society and handling, carrying and transportation of goods incurred by moving activities of institutes and residents.)

Table 1.3 Composition of total value of social logistics for 2012–2016

Indicator	2012		2013		2014		2015		2016	
	Value (trillion RMB)	Share (%)	Value (trillion RMB)	Share (%)	Value (trillion RMB)	Share (%)	Value (trillion RMB)	Share (%)	Value (trillion RMB)	Share (%)
Industrial products logistics	162.0	91.4	181.5	91.8	196.9	92.2	204.0	93.1	214.0	93.2
Imported goods logistics	11.5	6.5	12.1	6.1	12.0	5.6	10.4	4.7	10.5	4.6
Agricultural products logistics, etc.	3.8	2.1	4.2	2.1	4.6	2.2	4.8	2.2	5.2	2.2
Total	177.3	100	197.8	100	213.5	100	219.2	100	229.7	100

Source Compiled from the National Logistics Operations Bulletin for 2012–2016, published by the National Development and Reform Commission, the National Bureau of Statistics, and the China Federation of Logistics and Purchasing

Table 1.4 Total logistics expense, increment and share in GDP for 2006–2016

Year	Total expense for social logistics cost (trillion RMB)	Increment from previous year (%)	Share in GDP (%)
2006	3.8	13.5	18.3
2007	4.5	18.2	18.4
2008	5.5	16.2	18.1
2009	6.1	7.2	18.1
2010	7.1	16.7	17.8
2011	8.4	18.5	17.8
2012	9.4	11.4	18.0
2013 ^a	10.2	9.3	16.9
2014	10.6	6.9	16.6
2015	10.8	2.8	16.0
2016	11.1	2.9	14.9

Source Compiled from the National Logistics Operations Bulletin for 2006–2016, published by the National Development and Reform Commission, the National Bureau of Statistics, and the China Federation of Logistics and Purchasing

^a*Note* In 2013, the Ministry of Transport adjusted the statistical scope of the freight volume and freight turnover, and the National Bureau of Statistics readjusted the total social logistics costs in 2013 and its share in GDP according to the freight volume and freight turnover under the new statistical scope. Values in this table are adjusted data

1.2.2 Total Expense of Social Logistics

In 2016, due to the slowdown of China's economy, the upgrading and transformation of its economic structure, the supply-side structure reform, and improved efficiency in logistics management, total expenses of social logistics in China stood at 11.1 trillion RMB, continuing a low speed growth of 2.9%, year-on-year. The share of total social logistics expense in GDP dropped to 14.9%, having declined for five years in a row since 2012, or 1.1% points lower than that of the previous year. Table 1.4 shows the total logistics expense, the increment and the share in GDP for 2006–2016. Table 1.5 shows the composition of total expense of social logistics in 2016.

1.2.3 Freight Volume and Freight Turnover

In 2016, growth rate of freight volume and turnover exhibited a sign of rebounding from those of 2015. China finalized 44.04 billion tons of freight volume, rising by 5.5%, year-on-year. It also finalized 18.53 trillion tons-km of freight turnover, rising by 3.9%, year-on-year. Table 1.6 shows the annual nationwide freight volume, freight turnover, and growth rate for 2006–2016.

Table 1.5 Composition of total expense of social logistics in 2016

Indicator	Value (trillion RMB)	Increment from previous year (%)	Share (%)
Total expense of social logistics	11.1	2.9	100
Including: Transportation expense	6.0	3.3	54.1
Storage expense	3.7	1.1	33.3
Management expense	1.4	5.6	12.6

Source Compiled from the National Logistics Operations Bulletin for 2016, published by the National Development and Reform Commission, the National Bureau of Statistics, and the China Federation of Logistics and Purchasing

Table 1.6 Annual nationwide freight volume, freight turnover, and growth rate for 2006–2016

Year	Freight volume		Freight turnover	
	Volume (billion ton)	Growth rate (%)	Freight turnover (trillion ton-km)	Growth rate (%)
2006	20.37	9.4	8.88	10.7
2007	22.76	11.7	10.14	14.2
2008	25.86	13.6	11.03	8.8
2009	28.25	9.2	12.21	10.7
2010	32.42	14.7	14.18	16.1
2011	36.97	14.1	15.93	12.3
2012	41.00	10.9	17.38	9.1
2013 ^a	40.99	–	16.80	–
2014	41.67	1.7	18.17	8.2
2015	41.76	0.2	17.84	–1.8
2016	44.04	5.5	18.53	3.9

Source Compiled from the China Statistical Yearbook (2016), and the China Statistical Bulletin of National Economic and Social Development (2016), both published by the National Bureau of Statistics of China

^a*Note* In 2013, the Ministry of Transport adjusted the statistical scope of the highway and waterway freight volume. In 2015, the Ministry of Transport adjusted the calculation method and the statistical scope of highway freight volume and turnover

Among the transportation modes, railway freight volume receded slightly, waterway transport maintained a low-speed growth, highway, civil aviation and pipeline transportation grew at relatively high speed. Tables 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 and 1.7 shows the freight volume, freight turnover and growth rate of different transportation modes in 2016.

Table 1.7 Freight volume, freight turnover and growth rate of different transportation modes in 2016

Indicator	Volume	Growth rate (%)	Share (%)
Total freight volume (billion ton)	44.04	5.7	–
Among which:	3.33	–0.8	7.6
Railway			
Highway	33.63	6.8	76.4
Waterway	6.36	3.7	14.4
Pipeline	0.70	5.3	1.6
Civil aviation (megaton)	6.67	6.0	–
Freight turnover (trillion ton-km)	18.529	4.0	–
Among which:	2.379	0.2	12.8
Railway			
Highway	6.121	5.6	33.0
Waterway	9.540	4.0	51.5
Pipeline	0.467	5.7	2.5
Civil aviation (billion ton-km)	22.110	6.3	–

Source Compiled from the China Statistical Yearbook (2016), and the China Statistical Bulletin of National Economic and Social Development (2016), both published by the National Bureau of Statistics of China

1.2.4 Cargo Throughput and Container Throughput of Port

In 2016, ports in China completed 13.20 billion tons of cargo throughput, rising by 3.5%, year-on-year, with the growth rate rebounding slightly. Foreign-trade cargo throughput amounted to 3.85 billion tons, rising by 5.1%, year-on-year. Table 1.8 shows the nationwide cargo throughput and growth rate of port for 2006–2016.

In 2016, ports in China completed 220.05 million TEUs of container throughput, rising by 4.0%, year-on-year, with the growth rate dropping slightly. Figure 1.5 shows the nationwide container throughput and growth rate for 2006–2016.

1.2.5 Cargo and Mail Throughput in Civil Airports

In 2016, cargo and mail transport in China's airports witnessed a swift growth, finalizing 15.10 million tons of cargo and mail throughput, rising by 7.2%, year-on-

Table 1.8 Nationwide cargo throughput and growth rate of port for 2006–2016

Year	National cargo throughput of port		Share of cargo throughput for foreign trade	
	Volume (billion ton)	Growth rate (%)	Volume (billion ton)	Growth rate (%)
2006	5.57	14.8	1.61	18.1
2007	6.41	15.1	1.85	14.6
2008	7.02	9.6	1.99	7.4
2009	7.66	9.0	2.18	9.8
2010	8.93	16.7	2.50	14.7
2011	10.04	12.4	2.79	11.4
2012	10.78	7.3	3.06	9.7
2013	11.77	9.2	3.36	9.9
2014	12.45	5.8	3.59	6.9
2015	12.75	2.4	3.66	2.0
2016	13.20	3.5	3.85	5.1

Source Compiled from the Statistical Bulletin of Transportation Industry for 2006–2016, published by the Ministry of Transport

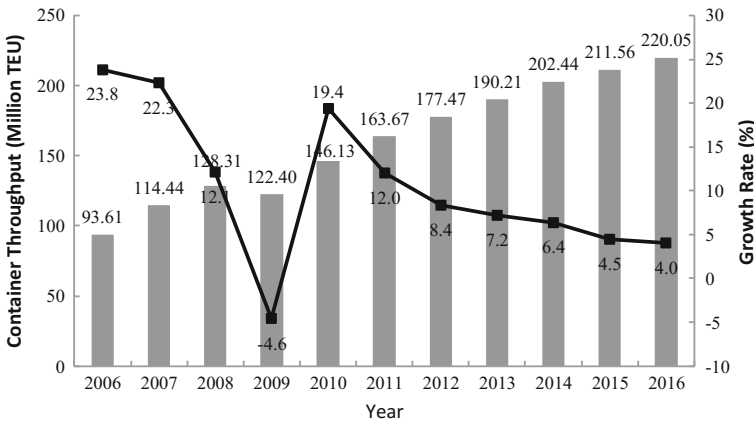


Fig. 1.5 Nationwide container throughput and growth rate for 2006–2016. Source Compiled from the Statistical Bulletin of Transportation Industry for 2006–2016, published by the Ministry of Transport

year. Besides, 50 airports in China realized 10,000 tons or more of cargo and mail throughput in 2016, with a combined volume accounting for 98.3% of the nation’s total. Airports in Beijing, Shanghai and Guangzhou finished 49.6% of China’s total volume. Figure 1.6 shows the nationwide cargo and mail throughput and growth rate in civil airports for 2006–2016.

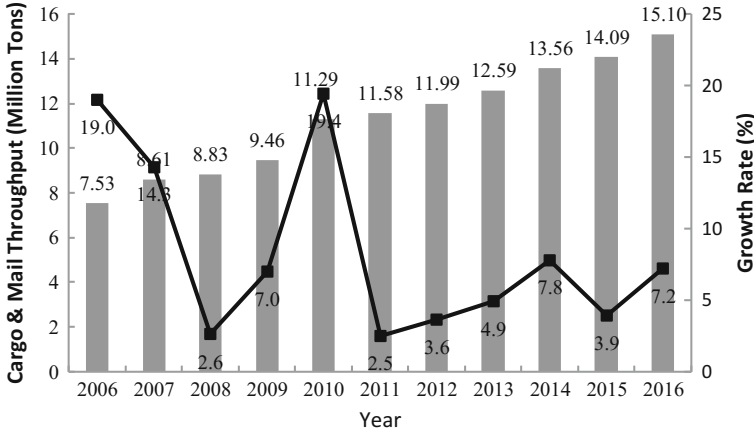
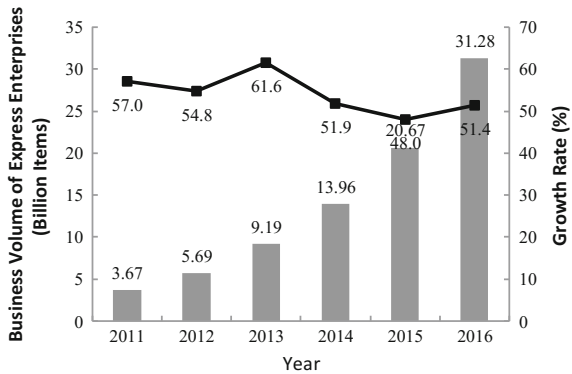


Fig. 1.6 Nationwide cargo and mail throughput and growth rate in civil airports for 2006–2016. *Source* Compiled from the Statistical Bulletin on the Productivity of National Airports for 2006–2016, published by the Civil Aviation Administration

Fig. 1.7 Nationwide business volume of express delivery enterprises and the growth rate for 2011–2016. *Source* Compiled from the Statistical Bulletin of Postal Service Industry for 2011–2016, published by the State Post Bureau



1.2.6 Business Volume of Express Industry

In 2016, volume of express delivery in China maintained a rapid growth. Express delivery enterprises in China completed 31.28 trillion items, rising by 51.4%, year-on-year, or 3.4% points higher than that of 2015. Figure 1.7 shows the business volume and growth rate of express delivery enterprises in China for 2011–2016.

As for the business structure of express delivery market, the proportion of out-of-city business volume rose slightly while business volumes of within-city, international and Hong Kong, Macao and Taiwan declined slightly. Figure 1.8 shows the business volume by categories of express delivery for 2011–2016

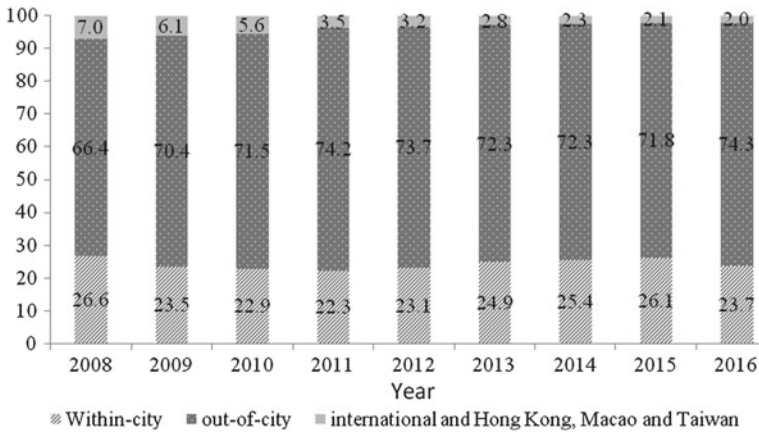


Fig. 1.8 Distribution of business volume of express delivery by category for 2011–2016. *Source* Compiled from the Statistical Bulletin of Postal Service Industry for 2008–2016, published by the State Post Bureau

1.3 Major Characteristics of China's Logistics Market

1.3.1 Structure of Logistics Demand Continued to Change

In 2016, due to the slowdown of national economic growth, the upgrading and transformation of economic structure, the supply-side structural reform, and the rapid development of Internet economy, the structure of China's logistics demand continued the adjustment seen in the past few years.

In the field of industrial production, growth rate of logistics demands in mining and high-energy-consuming industries slowed down visibly. In 2016, production of coal in China dropped by 9.0%, year-on-year, production of crude oil fell by 7.3%. Production of crude steel rose by 1.2%, that of cement increased by 2.5%. Production of nonferrous metals grew by 2.5% with growth rate falling by 3.3% points, year-on-year. Added value of chemical industry rose by 7.6%, with the growth rate falling by 1.7% points, year-on-year. Due to these factors, logistics demand in mining industry fell by 1%, unlike in the previous year which saw a 2.7% growth; logistics demands in the six major energy-consuming industries² dropped quarter by quarter: it grew by 6.3% in Q1, by 6.1% in Q2, 5.1% in Q3 and 3.6% in Q4. (China Federation of Logistics & Purchasing & China Logistics Information Center 2017). Since 2014, the total railway freight volume, predominately for bulk commodities such as coal and iron ore, has recorded a negative growth for three years in a row.

²The six major energy-consuming industries include petro processing, coking and nuclear fuel processing industry, chemical raw materials and chemical product manufacturing industry, non-metal mine product industry, black metal smelting and rolling industry, nonferrous metal smelting and rolling industry, power and heat generation and supply industry.

In the field of consumer goods, stimulated by the consumption upgrading, the O2O, the sharing economy and the new business models, logistics demands pertaining to livelihood, such as cold chain, pharmaceutical, e-commerce and within-the-city prompt delivery, grew rapidly. In 2016, demands for cold-chain logistics in China reached 220 billion RMB, rising by 22.3% (Cui 2016). Major express-delivery enterprises, such as SF Express, YT Express and EMS, entered the cold-chain logistics market; CHINA RAILWAY opened many cold-chain cargo trains. In terms of pharmaceutical logistics, rough statistics show that in 2016, total sales of seven categories of pharmaceutical products in China³ (including VAT) amounted to 1.84 trillion RMB, rising by 10.4%. Sales made by a total of 192 direct-reporting pharmaceutical logistics enterprises in China⁴ (excluding VAT) reached 900.6 billion RMB, distributing to over 1.22 million clients (the Ministry of Commerce, 2017). In terms of e-commerce logistics, in 2016, e-commerce transaction volume reached 20.2 trillion RMB, rising by 23.6%, year-on-year (iResearch 2017). In 2016, business volume of express delivery industry, highly correlated to e-commerce, reached 31.28 billion items, rising by 51.4%, year-on-year. In terms of within-the-city prompt delivery, the online food ordering market size in 2016 reached 166.24 billion RMB, rising by 33.0%, year-on-year (iiMedia Research 2017); within-the-city demand for prompt delivery of fresh food, cakes and flowers also grew rapidly. In the first three quarters of 2016, the prompt delivery orders amounted to 1.36 billion items (Analysis 2016). There was a rush to fill the rapidly booming prompt delivery market; platforms like Ele.me, Baidu Inc. and Meituan built the prompt delivery system that employed millions of full-time and part-time couriers; express delivery enterprises SF Express, YT Express and ZJS Express also launched new products for prompt delivery. Several innovative enterprises specialized in within-the-city prompt delivery, such as Ishansong, Uupaotui and Linjjia.me, also came into being.

1.4 “Internet + Efficient Logistics” Progressed Rapidly

In 2016, to tackle the challenges posed by reduced population bonus and meet the customers' increasing demand for better logistics services, logistics industry in China sped up the adoption of Internet and big-data technologies, and strove to improve the intelligent operations in warehousing, transportation and distribution. The move also encouraged the logistics industry to upgrade and transform itself from the labor-intensive type to technology-intensive type.

In the field of “Internet + warehousing,” large e-commerce enterprises Alibaba Group and JD.com are vigorously pushing forward the R&D and application of intelligent warehousing system. In August 2016, TMALL, owned by Alibaba, put into operation a 100,000-m² intelligent warehouse. This warehouse uses the powerful data

³Including medicines, medical devices, glass instruments, Chinese patented medicines, Chinese herbal medicines, chemical agents and others.

⁴Refer to medical logistics enterprises that submit statistics directly to the Ministry of Commerce.

processing and analytical capability of Cainiao Network to make intelligent storage location adjustment and operations guidance. Specifically, the system makes adjustment to locations of goods according to the sales status, placing those goods with high sales in locations closer to the exit of the automatic sorting and picking system, so as to shorten the transmission distance and picking time. It also provides guidance for stock replenishment and supplier replenishment operations within the system based on real-time sales data. In October, JD opened to the public its own-developed automatic logistics warehousing system which consists of robots, AI algorithms, and data-cognition networks. The system adopts many intelligent logistics robots, which work cooperatively; by using AI, deep learning and digital image recognition technologies, industrial robots can make their own judgments and accomplish various complex tasks, thus realizing automation in goods picking, transport and outbound operations. The storage efficiency in this warehouse system is more than ten times of that in traditional horizontal shelf, with robots making 3600 picks per hour, five or six times faster than the traditional manual operation. In the field of “Internet + transport,” a number of innovative enterprises that have IoT and big-data technologies, by providing data and information service for transport operators and owners of goods, have effectively improved the operating efficiency of transport. For example, a Beijing enterprise uses IoT technology to collect real-time data pertaining to vehicle position, engine operations and driver’s status, to make analysis and provide suggestions for managing the fleet. In this way, it effectively improves the transport efficiency of the fleet and reduces the operating cost. By the end of 2016, the company had served more than 30,000 clients and matched them up with over 300,000 vehicles; its clients span across the fields of express delivery, production/manufacturing, professional transportation and contract logistics. In addition, Zhejiang Lujing Technology Co., Ltd., Jiangsu Manyun Software Technology Co., Ltd., and other highway Internet platform enterprises that pair goods with trucks, use big data, cloud computing and AI technology to provide goods owners and small and medium-sized transport operators with intelligent truck-goods pairing, thus effectively improving the distribution efficiency of highway transport and reducing the ratio of empty trucks on the road. In 2016, 51xcb.cn came into being, the first of its kind in China, featured “Internet + intelligent waterway” service platform that pairs ships with goods. This platform, focusing on distribution centers of bulk goods along the Yangtze River, has a nationwide operation to provide ship information, transport capacity pairing, en route management of goods, and online settlement service for goods owners and ship owners.

In the field of “Internet + delivery,” the e-commerce parcels are now being delivered via intelligent routing. Large online catering platform enterprises use intelligent order allocation extensively to considerably elevate the operating efficiency in delivery and effectively improve the customer experience. During the “Double 11” Shopping Festival in 2016,⁵ the intelligent order allocation of express-delivery parcels were widely used; 70% of parcels were assigned delivery routes through intelligent

⁵“Double 11” Shopping Festival is the annual online shopping festival in China, which was pioneered by the Alibaba Group on November 11th, 2009.

algorithms, which greatly improved the operational accuracy and speed. Large online catering platform enterprises Ele.me, Baidu Inc., and Meituan have established the intelligent delivery and take-out system. Through the intelligent delivery and take-out system, the platform enterprises can assign orders to nearby couriers, decide on the optimal delivery route, and track the pickup and delivery routes of the couriers, thus effectively shorten the delivery time, and improve the accuracy and safety of food delivery service.

1.4.1 Integration of Logistics Resources Deepened

In 2016, driven by the reform of State-owned enterprises (SOEs), market competition and the capital expansion, relevant logistics enterprises in China integrated resources through regrouping, IPO, induction of venture capital, alliance, merger and acquisition, and partnership. The extent and depth of resource integration were evidently broadened, which facilitated the transformation and upgrading of the logistics industry and elevated the level of logistics operations.

Large logistics SOEs have rapidly and steadily pushed forward regrouping and integration. To build world-class logistics enterprises in China having international competitiveness, the State Council of China, in December 2015, approved merging the COSCO Group and China Shipping Group into China COSCO Shipping Group, and approved China Merchants Group to acquire SINOTRANS & CSC. By the end of 2016, China COSCO Shipping Group had finalized thorough integration of seven core business sections in shipping, port and logistics, as well as overseas business, resulting in the four public-company platforms specialized in container transport, port operations, shipping finance, and oil and gas transport. It had markedly fortified its size, strength, comprehensive advantages, and international influence. In 2016, China COSCO Shipping Group achieved an annual profit of 16 billion RMB, reduced its total operating cost by 8.77%, and preliminarily demonstrated the synergic effect. Also in 2016, China Merchants Group steadily pushed forward the strategic regrouping with SINOTRANS & CSC. After the integration, the strength of China Merchants Group was markedly bolstered, showing evident advantages in logistics resources. In shipping business, by the end of 2016, the total transport capacity of China Merchants Group's shipping business had reached 33.2 million deadweight tons. In terms of logistics business, by the end of 2016, the sector of Comprehensive Logistics in China Merchants Group had established 2443 logistics outlets in China, owned and operated 96 outlets in 38 countries and regions in the world, whose business covered major trading countries and regions. Besides, it had owned and commanded 10.23 million m² warehouse and storage yard in China.

On the e-commerce front, large e-commerce platform enterprises, by establishing e-commerce logistics alliance, building their own logistics systems, and cooperating with express delivery companies to extend their transport capacity, are active to integrate logistics resources and improve the e-commerce logistics services in the country. In March 2016, Cainiao Network of Alibaba, in partnership with its

major Chinese and overseas logistics partners, established Cainiao Alliance. In this alliance, Cainiao Network acts as the rule maker and coordinator, which effectively integrates and links resources for enterprises in the industry, so as to build an efficient e-commerce logistics system supported by intelligent logistics. In November, JD opened three major logistics service systems to the third-party firms on its platform, namely, the warehousing-distribution supply chain service, the JD express delivery service, and the JD logistics cloud service. On the one hand, the move has boosted the usage rate of JD's logistics facilities. On the other hand, it has optimized the logistics efficiency of the third-party firms. In November, the take-out platform Ele.me went into partnership with YT Express to release the excess transport capacity during off-peak take-out period, so as to provide help for the last-mile delivery for YT Express.

In the field of express-delivery logistics, some large private express-delivery enterprises were listed in capital markets in China and abroad. Some medium-sized express-delivery enterprises bulked up quickly by attracting capital investments, thus accelerating the integration, transformation and upgrading of the industry. As for large private express-delivery enterprises, in October 2016, YT Express got listed in Shanghai Stock Exchange, becoming the first express delivery service provider in China that was listed in the A-share market. ZTO Express was listed in the New York Stock Exchange, becoming China's first express delivery service provider in the US capital market. In November 2016, STO Express and Yunda Express were listed in the Shenzhen Stock Exchange; the IPO of SF Express was approved by the China Securities Regulatory Commission. Influenced by the IPO of large express delivery enterprises, medium-sized express delivery enterprises were also attempting to accelerate their development by drawing in additional capital investment. For instance, in 2016, TTK Express received 600 million RMB financing; Sure 56 obtained 3 billion RMB financing; Best Logistics garnered 760 million USD funding from more than ten new investors; Quanfeng Express obtained 1.25 billion RMB investments. Funds gathered by large and medium-sized express-delivery enterprises from various channels were mainly spent on increasing network coverage and density, upgrading software and hardware facilities, integrating franchisees, and expanding into new business fields. These measures have robustly pushed China's express delivery industry to upgrade and transform into scaled, standardized, intelligent and international development. According to statistics of the State Post Bureau, in 2016, China's concentration index CR8 of express-delivery service brands stood at 76.7; this implies that eight leading enterprises, including SF Express, EMS and STO Express, dominated the market, and the concentration in the industry was quite high.

In the field of highway logistics, a number of logistics enterprises, by carrying out strategic partnership and acquisition, have realized complementary advantages and gained strength, thus effectively improving their operating efficiency and profit while expanding their scope of business. For example, in 2016, Suning Logistics Co., Ltd. established the strategic partnership with Annto Logistics Co., Ltd., which allows them to share their nationwide resources, access each other's logistics management system and establish a nationwide business-sharing logistics platform. The highway express-delivery enterprise Deppon Logistics Co., Ltd. built a partnership with

Fuyoukache.com, an Internet platform for pairing goods with trucks, for intensive cooperation; Deppon would provide its partner with steady sources of goods while Fuyoukache.com would provide Deppon with efficient transport resources. Since the partnership was established, Deppon's operating cost has been lowered by 11% on average, while processing time for aberrant cases was reduced from 15 days to three days.

In the field of international logistics, CHINA Railway started to use the "China-Europe freight rail lines" unified brand-name in June 2016; by adopting the "unified brand-name logo, unified transport organization, unified transport pricing, unified service standard, unified operating team, and unified coordination platform," it strives to build up the "China-Europe freight rail lines" brand-name. This move holds significant meaning for optimizing and integrating the operations of existing cargo trains, encouraging positive internal competition, expanding the logistics service platform, and promoting the healthy and orderly development of the China-Europe freight rail lines. In 2016, 1702 trips of China-Europe cargo trains traveled between China and Europe, a number increased by 109%, year-on-year; of which 572 were returning trips from Europe to China, a number rising by 116%, year-on-year.

1.4.2 Logistics Enterprises Bolstered the Overseas Network Layout

In 2016, China's logistics enterprises continued to improve logistics operations along the "Belt and Road" and the overseas cross-border e-commerce logistics system, thus helping push forward the "Belt and Road" Initiative and the transformation and upgrade of foreign trade.

In terms of the "Belt and Road" logistics development, in August 2016, China COSCO Shipping Group spent 368.5 million Euros to acquire 67% equity of Piraeus Port in Greece. Since 2009, China COSCO Shipping Group has been making high-quality investments in this port. After years of concerted effort, it has successfully improved the competitiveness and prominence of this port in the international shipping market. Presently, Piraeus Port has become a major hub port in the eastern region of the Mediterranean for many international container shipping companies. It also functions as an important logistics node for China to cooperate with countries and regions along the "Belt and Road." In October, the Melaka Gateway deepwater wharf, co-built by Malaysia and China, laid the foundation. This project is strategically located in the Malacca Strait, and is a model of friendly cooperation between China and Malaysia and other countries and regions along the "Belt and Road." The project is of great significance to stimulate the infrastructure construction and the tourism industry in Malacca and to promote the economic growth in both Malaysia and China. In November, China Merchants Group and Djibouti Ministry of Finance signed an investment agreement to establish the Djibouti FTZ. Djibouti, a key node along the global trade shipping line, connects Asia, Europe and Africa. The phase-I

area in Djibouti FTZ covers 2.4 km², comprising the commercial logistics service, export processing, and auxiliary commercial facilities.

In terms of cross-border e-commerce logistics system, cross-border e-commerce logistics enterprises had made greater stride in building overseas warehouses; express-delivery enterprises had added international routes while elevating their capability in cross-border logistics services. In 2016, 4PX Express, a benchmark enterprise in cross-border e-commerce logistics industry, added 600 professional logistics service staffs globally, rising by 32.1%, year-on-year, and processed more than two million orders per day, rising by 400%, year-on-year. By the end of 2016, 4PX Express had owned more than 20 global order fulfillment warehouses and transit centers in 12 countries and regions in the world, with an annual sales revenue exceeding 500 million USD. Another famous cross-border e-commerce logistics service provider WINIT Corporation opened its Belgium warehouse in 2016. The first phase project occupied a floor space of 5000 m². By the end of 2016, WINIT had owned and operated nine overseas warehouses totaling 86,000 m², handling 184,000 orders per day. In 2016, the international e-post service of EMS augmented its routes to 24 countries including Norway and Israel, covering 32 countries and regions in total.

1.4.3 Green Logistics Made Further Progress

In 2016, logistics industry in China was active to comply with the new green development philosophy proposed in the 13th Five-year Plan; notable progress has been made in developing green logistics.

As e-commerce and express-delivery logistics make rapid expansion in the past few years, express-delivery business volume grew rampantly in 2016, generating noticeable problems of environmental pollution. To push forward environmentally-friendly logistics, Cainiao Network and 32 partners initiated the Green Program in 2016 to implement several measures on environmental protection. For instance, it promoted the e-document, adopted the express-delivery packages that are 100% biodegradable and the non-adhesive-tape environmentally-friendly cartons, and established the packaging-material recycling system. It also converted the delivery vehicles to the new-energy type.

In terms of waterway transport, in January 2016, China set up the vessel's air pollutants emission controlled region along the Pearl River Delta, Yangtze River Delta and Pan-Bohai (Beijing-Tianjin-Hebei) waterways. By requiring ships to use low-sulfur fuels and shore power in the emission controlled areas, it aimed to control the emissions of pollutants from the ships. Besides, the Ministry of Transport of China also encouraged the waterway industry to use LNG in their operations. By the end of 2016, inland rivers in China had built more than 120 LNG-powered ships, and with additional 500 ships being built.

In terms of transport vehicles, China continued to phase out old trucks and ships. According to statistics of the Ministry of Transport of China, by the end of 2016,

China had 13.52 million cargo trucks, a number down by 2.7%, year-on-year, whose total tonnage reached 108.27 million tons, rising by 4.4%, year-on-year. China had 160.1 thousand transport ships, down by 3.5%, year-on-year, whose net load stood at 266.23 million tons, down by 2.3%, year-on-year.

1.5 Summary

This chapter mainly discusses the domestic and overseas environment for China's logistics development, the overall status of its logistics market, and the major characteristics in its logistics market.

The development environment for China's logistics in 2016 was somewhat murky; the world economy recovered slowly, the growth rate of global trade recorded the lowest ever since the international financial crisis, and the trade protectionism trend was intensified. China was confronted with greater downward pressure on its macro-economy, and overriding economic structural dissonance. Under this background, China's Government strove to push forward the supply-side structural reform and innovation-driven strategy, and continued to promote high-level opening-up to the outside world. Furthermore, as the nation's economy maintained a steady growth and the new momentum of economic growth accelerated the development, they provided support for the logistics industry to upgrade its quality, efficiency, and innovative endeavor. In terms of the overall scale and condition of the logistics market in 2016, total value of social logistics in China showed a steady and upward trend; total expense of social logistics maintained a low-speed growth; the proportion of total social logistics expense in GDP kept falling. The growth rates of freight volume, freight turnover and port cargo throughput recovered slightly. Airport cargo and post throughput realized rapid growth. Express delivery business volume continued to soar at a high speed. Several major characteristics of China's logistics market in 2016 are apparent. Due to the economic slowdown and the transformation and upgrading of economic structure in the nation, growth rate of demands for bulk raw materials logistics in China continued to fall. However, demands for residents' consumption logistics remained flourishing. To respond to the challenges posed by falling population bonus and meet the customers' increasing demands for better logistics services, China hastened the launching of Internet and big-data technologies. The effort, on the one hand, enhanced the intelligent operations in warehousing, transport and distribution; on the other hand, promoted the upgrading and transformation of the logistics industry from labor-intensive focus to technology-intensive emphasis. Driven by the reform of State-owned enterprises, market competition, and capital infusion, China enhanced the depth and extent of resource integration in the logistics field. Some logistics enterprises augmented their overseas networks in support of the "Belt and Road" Initiative, and the transformation and upgrading of foreign trade. Green logistics began to capture attention and made notable progress in 2016.

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Chapter 2

Logistics Facilities and Technological Development



Fan Qin

This chapter introduces the progress China made in building its transportation infrastructures and logistics nodes in 2016, and presents its latest development in logistics facilities, logistics informatization and standardization. In 2016, China steadily pushed forward building its transportation facilities and continued to improve the transportation networks. Logistics parks (centers) and various types of professional warehousing facilities were constructed as planned; in particular, the number of logistics parks (centers) and bonded logistics nodes that support multimodal transport multiplied considerably. Various types of logistics equipment continued to progress toward automation and green development. China also sped up building its regional logistics information platforms and professional logistics cloud platforms. Establishment of several task forces for professional logistics standardization provided solid assurance for China's progress in standardization of professional logistics. In 2016, China released many fundamental and professional logistics standards, thus promoted the regulated operations and improved the efficiency in the logistics field.

This chapter has four sections. Section 2.1 introduces the new progress China made in 2016 in the construction of transportation facilities and comprehensive transport system. Section 2.2 describes the new characteristics in the construction of logistics parks (centers) and warehousing facilities in China in 2016. Section 2.3 depicts the scale and technological changes in employing transport vehicles and warehousing equipment in China in 2016. Section 2.4 discusses the new development in logistics informatization and standardization.

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2.1 Transportation Infrastructures¹

In 2016, China continued to upgrade its transport network; new progress was made in building transportation infrastructures in rural areas, and in Central and Western China; the high-speed railway network consisting of four horizontal and four vertical lines had primarily been completed; construction of large-sized berths still kept up the prevalent trend. In addition, China continued to improve the building of composite transport channels; construction of domestic composite transport channels and global regional transport channels were carried out swiftly, thus connecting various transport means in a more effective way and improving the logistics capability of the transport channels.

2.1.1 Highway Infrastructures

2.1.1.1 Scale of Highway Network

By the end of 2016, total mileage of highways in China reached 4.70 million km, rising by 119,000 km from the previous year. The highway density stood at 48.92 km/100 km², increasing by 1.24 km/100 km². Figure 2.1 shows the total highway mileage and highway network density for 2006–2016. China invested 16.36 billion RMB in highway environmental protection in 2016, of which 11.15 billion RMB was invested in ecology-preserving measures and 2.40 billion RMB was invested in pollution-control facilities.

2.1.1.2 Structure of Highway Network

In 2016, proportion of graded highways in China continued to rise. By the end of 2016, the mileage of grade-IV and above highways reached 4.23 million km, accounting for 90.0% of the total highway mileage and increasing by 1.6% points over the previous year. The mileage of expressways in China amounted to 131,000 km, increasing by 7400 km from the previous year; mileage of driveways on the expressways reached 579,500 km, representing an addition of 31,100 km in 2016.

2.1.1.3 Highway Construction in Rural Areas

In 2016, China invested 365.92 billion RMB in building highways in rural areas, rising by 13.4%; the country built or renovated 299,000 km of rural highways. By

¹Note: Unless specified otherwise, all data in this section on transportation infrastructures in 2016 are drawn from the *transportation industry statistical bulletin 2016*, released by the ministry of transport of P.R.C., 17 Apr 2017.

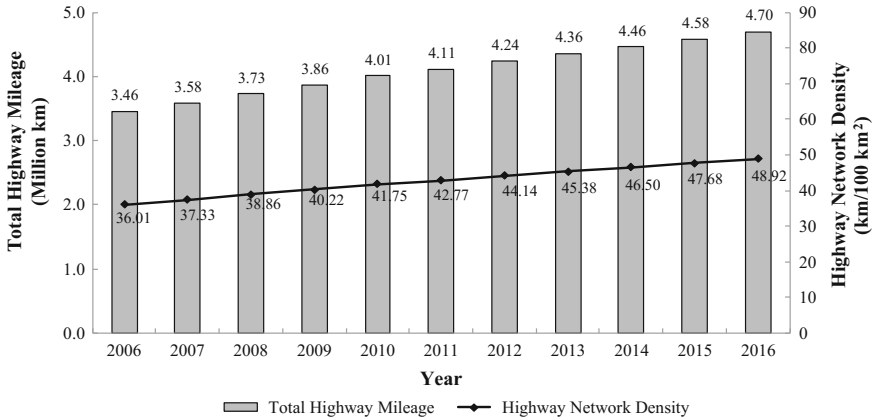


Fig. 2.1 Total highway mileage and highway network density for 2006–2016. *Source* Compiled from the China Statistical Yearbook for 2011–2016, published by the National Bureau of Statistics, the Statistical Bulletin of Highway and Waterway Transportation Industry (2006–2012), and the Transportation Industry Statistical Bulletin for 2013–2016, published by the Ministry of Transport

the end of 2016, highway mileage in rural areas reached 3.96 million km, including 562,100 km county highways, 1.15 million km township highways, and 2.25 million village highways. 99.99% of total towns/townships in China had access to highways and 99.94% of administrative villages had access to highways.

2.1.1.4 Highway Construction in the Western Region

In 2016, many expressways in Western China such as Shaanxi and Sichuan provinces were completed and put into operation. The opening of Yashiga-Tongren Expressway ended the history of without expressway in Tibetan Autonomous Prefecture of Huangnan. Total highway mileage in operation in Tibet reached 82,543 km, including 1,334 km of Grade-II and above highways and 20,678 km of paved roads, rising by 5.35, 24.59 and 50.53%, respectively (Chinatibetnews.com 2017). These highways not only improve the logistics throughput capability and efficiency in Western China, but also provide vital infrastructure assurance for the sound development of the Belt & Road Initiative and Yangtze River Belt Strategy in China.

2.1.2 Railway Infrastructures

2.1.2.1 Scale and Structure of Railway Networks

In 2016, the scale of railway networks in China continued to expand. Mileage of operating railways nationwide reached 124,000 km, rising by 2.5% from the previous year. Mileage of operating high-speed railways exceeded 22,000 km. Density of the railway network stood at 129.2 km/10,000 km², growing by 3.2 km/10,000 km² (National Railway Administration of the P.R.C. 2017). Growth rate in railway network density in China dropped slightly from that of the previous year.

Meanwhile, China continued to optimize the structure of its railway networks. By the end of 2016, mileage of double-tracked railways rose by 5.2% from the previous year. Proportion of double-tracked railways rose by 1.4% points. Mileage of electrified railways rose by 7.4%; the proportion of electrified railways grew by 3.0% points. Operating railway mileage in the Western Region reached 50,000 km, rising by 4.6%. Figure 2.2 gives the total mileage of operating railways and growth rate of the Western Region for 2006–2016.

2.1.2.2 Dedicated Freight Railways

In 2016, China continued to push forward the construction of dedicated freight railways. In April, the freight railways connecting Arongqi in Inner Mongolia to Zhalantun was put into operation, which alleviated the pressure of high cost on local highway transport. In May, the Baoji-Linyou Railway in Shaanxi was put into operation, which considerably increased the coal transport capacity in the Baoji-Linyou mine area and relieved the transport pressure on the Baoji-Zhongwei Railway

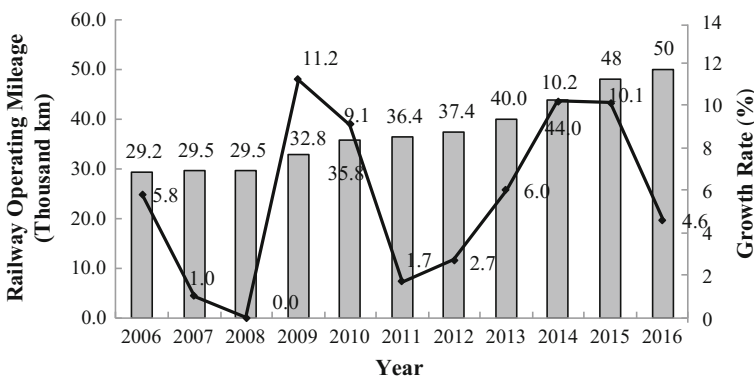


Fig. 2.2 Total mileage of operating railways and growth rate in the Western Region for 2006–2016. *Source* Compiled from data in the official website of the National Bureau of Statistics and the Railway Statistical Bulletin (2016), published by the National Railway Administration of P.R.C

(Peoplerrail.com 2016). In November, the dedicated port railway in Fuyuan of Heilongjiang Province was put into operation, forming a railway-marine channel for international trade that connects China, the region of Japan Sea, and Russia, signifying that an additional channel of trade with Russia was built in the northern frontier of China (Chinanews.com 2016). These dedicated freight railways will actively promote the coal and commercial logistics along the Silk Road Economic Belt in China.

2.1.2.3 High Speed Railway Construction

In 2016, 1903 km high speed railways were put into use; total mileage of operating high speed railways amounted to more than 22,000 km in China (Chnrailway.com 2017). Zhengzhou-Xuzhou High Speed Railway, and Shanghai-Kunming High Speed Railway were fully operational, marking that China has basically formed the “Four Horizontal and Four Vertical” High Speed Railway network as planned in the *Medium and Long-term Railway Network Plan (Revised in 2008)*. In November, the Chongqing-Wanzhou High Speed Railway, an essential section of Zhengzhou-Chongqing High Speed Railway, was put into operation, which improved the logistics transport capability of Chongqing as a major nodal city in logistics transport.

2.1.3 Waterway Infrastructure

2.1.3.1 Scale of Waterway Infrastructure

In 2016, China continued to expand its waterway infrastructures. For inland-river waterway construction, by the yearend, the navigation mileage of inland-river waterway in China reached 127,100 km, rising by 100 km from the previous year. The Yangtze River waterway and Yellow River waterway navigation mileage rose by 31 and 45 km, respectively. On port construction, China built, renovated or expanded 173 berths in inland-river ports, adding 133.35 million tons of throughput capacity, in which the 10,000-ton and above berths raised the throughput capacity by 39.89 million tons. In 2016, China expanded and improved 750 km of inland-river waterways. In addition, the country built, renovated or expanded 171 berths in coastal ports which amounted to 224.87 million tons of newly-added throughput capacity, in which the 10,000-ton and above berths augmented new throughput capacity by 210.19 million tons. Figure 2.3 shows China’s added port throughput capacity for 2006–2016. In terms of construction of port environmental facilities, China invested 5.50 billion RMB, of which 715 million RMB was spent on ecology-preserving measures and 3.773 billion RMB was spent on pollution-control facilities.

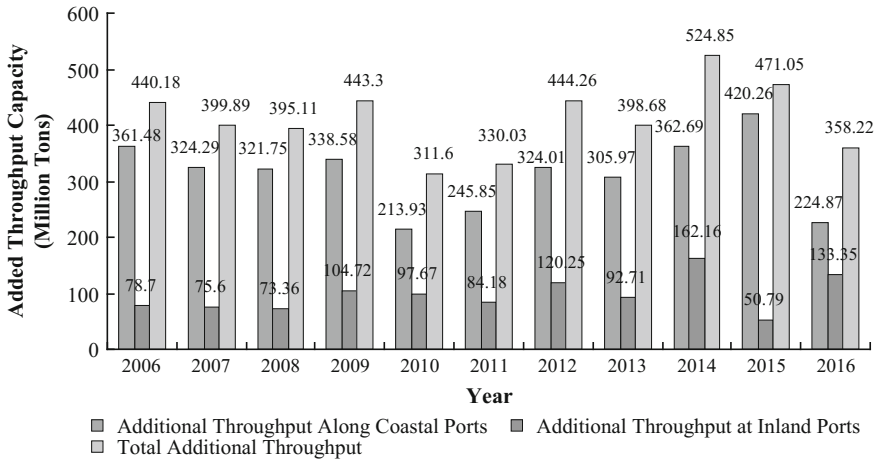


Fig. 2.3 China’s added port throughput capacity for 2006–2016. *Source* Compiled from the Statistical Bulletin of Highway and Waterway Transportation Industry (2006–2012), and the Transportation Industry Statistical Bulletin (2013–2016), published by the Ministry of Transport

2.1.3.2 Grading and Structure of Inland Waterway

In 2016, proportion of China’s high-grade waterways in inland rivers continued to rise. By the yearend, mileage of graded inland-river waterways in China reached 66,400 km, accounting for 52.3% of total mileage of inland-river waterways, growing by 0.1% points from the previous year. Of these waterways, there were 12,100 km grade-III and above waterways, accounting for 9.5% of the total, and increasing by 0.4% points. Mileage of graded inland waterways and its proportion in total inland waterway mileage for 2006–2016 are as shown in Fig. 2.4.

2.1.3.3 Port Berths Continued to Expand in Size

In 2016, port berths in China continued to evolve toward large-sized ones. By the yearend, ports in China had 2317 berths with size of 10,000 tons and above, rising by 96 from the end of previous year. Coastal ports had 1894 berths with size of 10,000-ton and above, rising by 87 from the previous year. The inland-river ports had 423 berths with size of 10,000-ton and above, rising by 9. Figure 2.5 shows the number of port berths with capacity of 10,000 tons and above for 2006–2016.

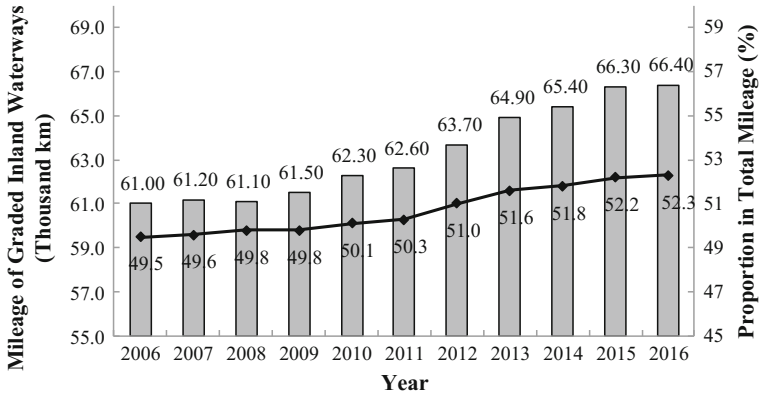


Fig. 2.4 Mileage of graded inland waterways and its proportion in total mileage for 2006–2016. *Source* Compiled from the Statistical Bulletin of Highway and Waterway Transportation Industry (2006–2012), and the Transportation Industry Statistical Bulletin for (2013–2016), published by the Ministry of Transport

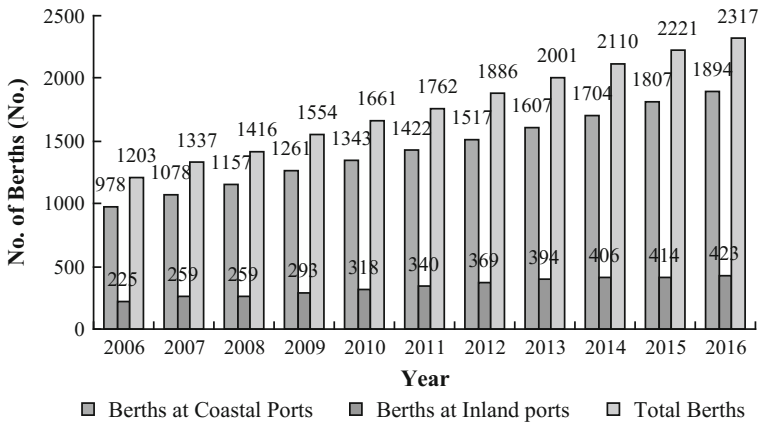


Fig. 2.5 Port berths with capacity of 10,000 tons and above for 2006–2016. *Source* Compiled from the Statistical Bulletin of Highway and Waterway Transportation Industry (2006–2012), and the Transportation Industry Statistical Bulletin (2013–2016), published by the Ministry of Transport

2.1.4 Civil Airport

In 2016, China had 218 (certified) civil airports (excluding Hong Kong, Macao and Taiwan; same below), including 216 airports with regular flights scheduled among 214 cities. In 2016, regular flights were newly scheduled in cities including Linfen in Shanxi, Shiyan in Hubei, Sanming in Fujian, Qionghai in Hainan, Guoluo in Qinghai, Wulan Chabu in Inner Mongolia, Zhalantun in Inner Mongolia, Sansha in Hainan

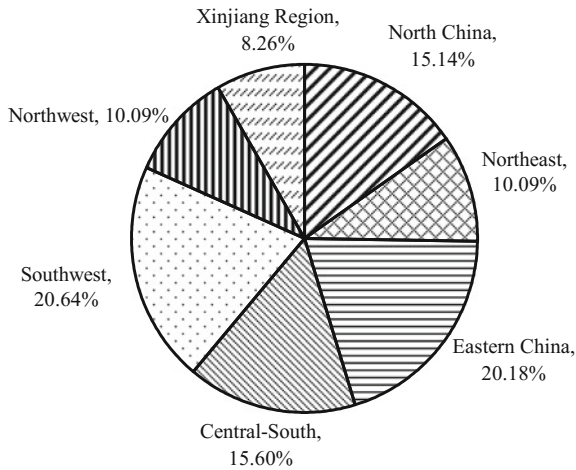


Fig. 2.6 Airport distribution by regions in 2016. *Source* Compiled from the National Airport Productivity Statistical Bulletin 2016, published by the Civil Aviation Administration of China (In the pie chart, the North China region includes Beijing, Tianjin, Hebei, Shaanxi and Inner Mongolia Autonomous Region; the Northeast China region includes Heilongjiang, Jilin and Liaoning; the East China region includes Shanghai, Jiangsu, Zhejiang, Shandong, Anhui, Fujian and Jiangxi; the Central-South China region includes Henan, Hubei, Hunan, Guangxi, Hainan and Guangdong; the Southwest China region includes Sichuan, Chongqing, Guizhou and Yunnan; the Northwest China region includes Shaanxi, Gansu, Ningxia and Qinghai; and the Xinjiang region refers to Xinjiang Autonomous Region)

and Cangyuan in Yunnan (CAAC 2017a). Airport Distribution by Regions in 2016 is as shown in Fig. 2.6.

2.1.5 Comprehensive Transportation System

2.1.5.1 The “Five Horizontal and Five Vertical” Channels

In 2016, China continued to improve the building of the “Five Vertical and Five Horizontal” (5V5H)² comprehensive transportation channels, thus promoting the

²In November 2007, NDRC released the *Mid-and-long-term Development Plan of Comprehensive Transportation Network*, which stipulated that China to build the comprehensive transportation channels consisting of Five Vertical and Five Horizontal lines (5V5H) in 2006–2020. The five vertical channels include South-North Coastal Transportation Channel, Beijing-Shanghai Transportation Channel, Manzhouli-HK-Macao-Taiwan Transportation Channel, Baotou-Guangzhou Transportation Channel and Linhe-Fangchenggang Transportation Channel. The five horizontal channels include North in Northwest China Maritime Transportation Channel, Qingdao-Lhasa Transportation Channel, Continental Bridge Transportation Channel, Along-Yangtze-River Transportation Channel and Shanghai-Ruilu Transportation Channel.

overall logistics transport capability. The various transportation means are more effectively connected as China continued to develop the multimodal transport. Of the “Five Vertical” transportation channels, newly-built expressways were put into operation along the Beijing-Shanghai transportation channel, Manzhouli-HK-Macao-Taiwan transportation channel, Baotou-Guangzhou transportation channel and Linhe-Fangchenggang transportation channel. New progress had been made in building of all “Five Vertical” transportation channels.

2.1.5.2 International Regional Transportation Channels

In 2016, China accelerated the building of international regional transportation channels, with improved capabilities in throughput, operation and service; these channels also afforded vital logistics support for the Belt and Road Initiative and the Yangtze River Economic Belt Strategy. The Lanzhou-South Asia international transportation channel was opened; the first China-Europe cargo train that passes through Qinghai-Tibet Plateau on Central Asia international transportation channel was opened. In the meantime, new progress was made in building the Southeast Asia international transportation channel and Northeast Asia international transportation channel.

2.2 Logistics Parks (Centers) and Warehousing Facilities

In 2016, China continued to increase the number of multimodal logistics parks, which function as the necessary logistics nodes for improving the comprehensive transportation capability in China. The number of bonded logistics nodes in the Western and Central Regions was markedly increased, which uplifted the commercial and trade logistics capability along the Belt and Road and the Yangtze River Economic Belt. In terms of dedicated logistics, China has sped up its construction of cold-chain logistics network. Meanwhile, refrigerated warehouses and automatic intelligent warehouses were utilized more prevalently.

2.2.1 Development Status of Logistics Parks (Centers)

2.2.1.1 Multimodal Transport Logistics Park (Center)

In 2016, as multimodal transport was popularized, China commenced on or completed building of a number of multimodal transport logistic parks (centers). Shaliang Logistics Park Highway Port of Hohhot Railway Bureau was put into use in October 2016, which is the largest highway-railway multimodal modern logistics base in Northwestern Region of China (Li 2016). This logistics park functions as a logistics

node that radiates across China's Northern Region and connects Europe and Asia, and also helps enhance the transportation system in the Northwestern Region.

In the Yangtze River Economic Belt region, Wangjiaying West Railway Station in Kunming of Yunnan Province, as the railway freight hub station and the modern railway logistics park in Yunnan oriented towards Southeast Asia, was put into operation in April 2016; it considerably improves China's capability in logistics and foreign trade towards Southeast Asia. In October 2016, the Zhejiang-Jiangsu-Anhui Inter-provincial Regional Logistics Center was put into trial operation, which focuses on railway-highway-waterway multimodal transport. China Railway Tianjin Container Central Station, the first marine-railway multimodal comprehensive container railway hub in Beijing-Tianjin-Hebei Region, was put into operation in June 2016. In the Northeastern Region, Shaling Logistics Park of Shenyang Railway Bureau began operation in March 2016, thus opening a new railway logistics channel for the Northeastern Region to reach the Northern Region, Eastern Region, Central Region, Southern Region, Southwestern Region and Northwestern Region of China.

2.2.1.2 Bonded Logistics Centers

In 2016, significant results were achieved in building bonded logistics centers in China. New bonded logistics centers in Shaanxi, Qinghai, Sichuan, Hubei and Zhejiang had passed the acceptance checks or had begun operations. These bonded logistics parks would help improve the bonded logistics capability along the Belt and Road route and the Yangtze River Economic Belt in China, thus promoting the development of export-oriented economy and the relevant specialty industries in the above regions.

2.2.2 Warehousing Facilities

2.2.2.1 Traditional Chinese Medicine Warehousing Network

In 2016, China made considerable progress in building Chinese medicine logistics bases. In 2016, China Association of Warehouses and Storage (CAWS) and China Association of Traditional Chinese Medicine certified seven National Logistics Pilot-test Bases of Chinese Medicines in Gansu, Sichuan, Shanxi, Hunan, Henan, Hebei and Jilin. Also, in December 2016, China built the National Chinese Medicine Logistics Pilot-test Branch Base in Beichuan, which is the first sub-warehouse base of Chinese medicine logistics. These bases help establish the preliminary Chinese medicine logistics system, thus playing the demonstration role in pushing forward building of Chinese medicine logistics bases, and helping develop and improve the Chinese medicine logistics system in China.

2.2.2.2 Cold Storage

Many provinces in China, including Xinjiang, Sichuan, Guizhou, Tianjin, Shandong, Anhui, Jiangxi, Fujian and Hainan, continued to push forward building of refrigerated warehouses, thus expanding cold-chain logistics networks and boosting the capability of cold-chain logistics and storage in China. By the end of 2016, total refrigerated warehouse capacity reached 107 million m³, growing by 21% since 2014. Nevertheless, the per capita capacity of refrigerated warehouse lingered at 0.143 m³, which is well below the world average of 0.2 m³ (Cold Chain International 2017).

2.2.2.3 Automated Intelligent Warehouses

In 2016, many enterprises, in particular some e-commerce enterprises, began to realize the important role of automated intelligent warehouses. They began to build or put into use automated intelligent warehouses to improve the efficiency of warehouse management. In August 2016, Cainiao Alliance opened its first automated intelligent warehouse in Zengcheng of Guangzhou. This warehouse system is capable of improving order-processing efficiency by more than 30% (Shi 2016). In September 2016, the Unattended Intelligent Warehouse in Chuxiong Power Supply Bureau, the first of this kind in Yunnan Power Grid, was put into use. Chuan Shan Jia Supply Chain Management Co., Ltd. in Zhejiang Province built an automated intelligent warehouse called Taiji Cloud Warehouse, which provides stock management, warehousing, and distribution services for parts and components of manufacturers and producers. It is expected that, in the next few years, market size of renovated intelligent warehouses in China will reach 140 billion RMB (Chinawuliu.com.cn 2017).

2.3 Logistics Equipment

In 2016, China continued the pace of developing various logistics equipment towards the automation and green orientation. The country continued to increase the number of railway freight trains, cargo planes and industrial warehousing vehicles, while improving the level of environmental protection and raising the load-carrying capability. At the same time, China was utilizing more automated warehouse equipment and rapidly improving the level of automation.

2.3.1 Transportation Tools

2.3.1.1 Possession of Transportation Tools

In 2016, China markedly increased the holding of freight trains to 764,000, rising by 41,000 from the previous year, representing a growth rate of 5.7% (National Railway Administration of P.R.C. 2017), making 2016 a year having the fastest growth of freight trains since 2013. Because newer highway freight trucks and freight ships are becoming more heavy-loaded, and because older trucks and ships are being eliminated sooner, China continued to see the reduction in the number of highway freight trucks and freight ships. The number of freight trucks was 13.52 million units in 2016, decreasing by 2.7% from the end of previous year. The country had 160,100 transport ships, declining by 3.5% from the end of previous year (The Ministry of Transport of P.R.C 2017). At the end of 2016, general aviation operators in China had a total of 2096 registered aircrafts (CAAC 2017b).

2.3.1.2 Loading Capacity and Greenness of Transportation Tools

In 2016, loading capacity of various transportation vehicles in China continued to grow. By the end of 2016, total load tonnage of freight trucks in China reached 108.27 million tons, rising by 4.4% from the previous year. The average net load tonnage of freight ships rose by 1.26% from the previous year, reaching 1,662.88 tons/ship (Ministry of Transport of P.R.C. 2017).

In 2016, China continued to improve the environmental-protection level of its highway transport vehicles, and increased the number of new-energy logistics trucks. In the meantime, all regions in China had issued relevant policies to encourage the use of new-energy logistics trucks. In terms of railway transport, the railway COD emission was reduced by 2.0% from the previous year. The emission of SO₂ was reduced by 13.9% from the previous year. Besides, the green railway mileage in China reached 45,700 km, growing by 2.7% from the previous year (National Railway Administration of P.R.C. 2017).

2.3.2 Warehousing Equipment

2.3.2.1 Shelves

In 2016, the Yangtze River Delta, the Circum-Bohai Area and the Pearl River Delta were three regions having greatest new demand for shelves; commercial logistics, pharmaceutical chemicals and food and beverages were top three sectors having new demands for shelves. The 3PL and garment and textile industries also showed greater new demands for shelves. In terms of the type of shelves adopted by enterprises, the

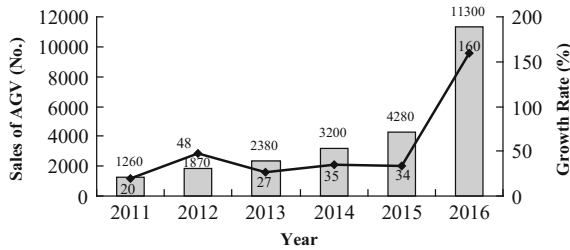


Fig. 2.7 AGV installation and growth rate. *Note* 2016 sales statistics include AGV, AGC and warehouse robots *Source* Compiled from AGV Ignited Revolution in Logistics Intelligence, SOHU Technology http://www.sohu.com/a/130252394_390227, 25 March 2017.

scope of automated warehouse shelves that attend to both storage ratio and retrieval efficiency continued to expand.

2.3.2.2 Forklifts

In 2016, of the forklifts employed by enterprises, the proportion of newly-added environmentally-friendly forklifts rose from 31% in 2015 to 31.5% in 2016, an increase of 0.5% points. Forklift manufacturers continued to increase the R&D investments, and were able to provide the 48-ton internal combustion engine forklifts and the 12-ton electrified forklifts, thus enhancing the capability of forklifts for heavier loads. They were also actively developing the new-energy forklifts; in particular, the electrified walking warehouse forklifts were used more extensively in the enterprises (Zhang 2017).

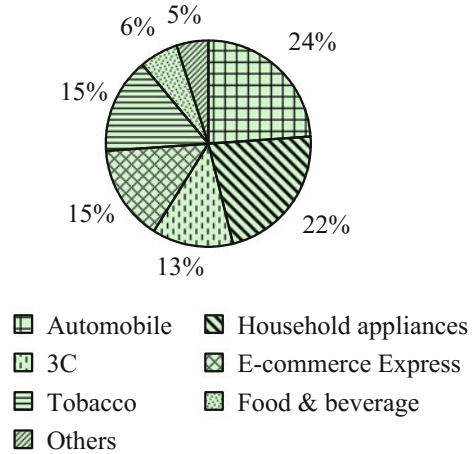
2.3.2.3 Automated Guided Vehicles (AGV)

In 2016, along with the development of intelligent logistics, China had evolved into the world's largest AGV market. AGV advances kept expanding the scope of applications, increasing the models, enhancing the functions, and markedly improving the automation and intelligence level. Guided by the relevant national policies, 2016 sales of AGV in China, including AGV,³ AGC,⁴ e-commerce warehouse AGV and outdoor heavy-load AGV, increased considerably over that of 2015, with total sales exceeding 11,300 units, rising by 160% from that of 2015 (see Fig. 2.7) (SOHU Technology 2017).

³AGV(Automated Guided Vehicle) refers to vehicles equipped with automated guiding device that are able to drive in the designated route, have safety protection and transfer functions.

⁴AGC(Automated Guided Cart) is a category of AGV which uses the simple AGV technology represented by Japan. The technology pursues simple and practical use, which is only used for moving goods without emphasizing on the automated load/unloading functions of AGV.

Fig. 2.8 Proportion of AGV/AGC products in industrial applications in 2016. *Source* Compiled from AGV Ignited Revolution in Logistics Intelligence, SOHU Technology http://www.sohu.com/a/130252394_390227. 25 Mar 2017



To date, AGV application has been expanded to many sectors encompassing industrial, commercial and services. Figure 2.8 describes the proportion of AGV/AGC product applications among all sectors of business in 2016. In 2016, AGV sales approached 1500 units; due to the rapid development of logistics intelligence in e-commerce express delivery industry, its AGV adoption accounted for 15% of total AGV sales (SOHU Technology 2017).

2.4 Logistics Informatization and Standardization

In 2016, China continued to improve the national comprehensive logistics public information platform, and push forward building of regional logistics cloud platforms. New progress was made in building certain dedicated logistics information platforms (such as express delivery logistics information platform and medicine logistics information platform). In terms of logistics standardization, several task-force teams were established for dedicated logistics standardization, thus providing sound organizational assurance for dedicated logistics standardization in China. In 2016, China issued many fundamental and dedicated logistics standards.

2.4.1 Development of Logistics Informatization in China

2.4.1.1 National Public Logistics Information Platform

China continued to push forward the construction of national logistics public information platforms, and improved the information connectivity on these platforms.

On July 1, 2017, the National Traffic & Transportation Logistics Public Information Platform (logink.org, LOGINK) placed its updated version online; the LOGINK Platform began to provide the one-stop logistics information service to external users through unified service window (LOGINK 2016a). In March 2016, LOGINK signed an agreement with CargoSmart, one of the world's three largest maritime shipping forwarding platforms, to establish a strategic partnership. The two parties would cooperate to push forward information connectivity of global maritime shipping logistics (LOGINK 2016b).

2.4.1.2 Regional Logistics Cloud Platforms

In 2016, various localities in China, basing on their own industrial characteristics, transportation attributes, and commerce and trade conditions, continued to push forward building of logistics cloud platforms. In October, Xiamen Port Container Intelligent Logistics Platform was put online. In November, Guangdong Shipping Trading Comprehensive Information Service Platform, the first of its kind in Southern China, was launched.

2.4.1.3 Professional Logistics Information Platforms

In 2016, guided by various policies of "Internet + efficient logistics," China made new progress in building professional logistics information platforms. In terms of warehousing logistics, China Warehouse Electronic Trading Platform and Urban Joint Distribution Public Information Platform provided warehousing logistics information service to more than 10,000 enterprises. In terms of express delivery logistics, in October, Yiwu Express Delivery Real-time Data Analysis System, the first of its kind in China, was put online. In the field of Internet of Vehicles (IoV), ehuodi, China's first "online truck-hailing" platform was granted legitimate status and put into operation, thus extending the online hailing model in urban freight. In terms of pharmaceutical logistics, as China facilitated the building of modern logistics system of Chinese herbal medicines, the public information management system for Chinese medicine logistics has also been established.

2.4.2 Status of Logistics Standardization

2.4.2.1 Working Groups of Logistics Standardization

In 2015, China initiated its efforts on group logistics standardization. Based on this, and according to the *CFLP Regulations on Group Standards*, CELP approved the establishment of the Working Group of Standardization for Logistics Information Platforms (WG3), the Working Group of Standardization for Modern Logistics of

Bulk Commodities (WG4) in March 2016, and the Working Group of Standardization for CELP Automobile Logistics (WG5) in May 2016. These three working groups of standardization would help improve China's development of logistics standards in logistics information platform, bulk commodity circulation and automobile logistics, thus upgrading the regulated operations and the efficiency in these three logistics fields.

Besides, in November 2016, China established the Iron & Steel Logistics Standardization Working Group of National Logistics Standardization Technical Committee (TC269/WG3), which would provide the assurance and driving force for the healthy and orderly development of steel logistics in China.

2.4.2.2 Compilation of National Fundamental Logistics Standards

In 2016, China instituted, revised, promulgated, or implemented many fundamental logistics standards, covering many aspects (such as logistics services, occupational competency of logistics personnel, logistics operations, and logistics informatization). In terms of logistics operations, as China keeps pushing forward pallet standardization, the proportion of standard pallet applications has risen and the standardization level of pallets has improved. Meanwhile, China considerably improved its standards of logistics informatization, which played an active role in promoting the development of intelligent logistics. For example, in January 2016, China released the *Standard of Traffic and Transformation Logistics Information Connectivity for 2015*. Some new standards for logistics informatization were added and some contents in existing standards were revised.

2.4.2.3 Compilation of National Professional Logistics Standards

In 2016, China made new progress in the standardization tasks of many logistics fields (such as cold-chain logistics, pharmaceutical logistics, chemicals logistics, and hazardous goods logistics). In particular, several standards in hazardous goods logistics were put into effect to provide potent regulations for monitoring and supervising the transport activities of hazardous chemicals.

2.5 Summary

This chapter discusses China's development in logistics facilities and relevant logistics technologies and standards in 2016. China continued to improve the scale and quality of highway networks in rural areas, the Central and Western Regions, and upgrade its logistics capability in the comprehensive transportation channels, providing solid channel assurance to promote the Belt & Road Initiative and the Yangtze River Economic Belt strategy. China sped up its building of multimodal logistics

parks (centers), greatly increased the number of bonded logistics nodes in the Central and Western Regions, and improved the commercial and trade logistics capability along the Belt & Road and Yangtze River Economic Belt in China. In terms of professional logistics, China rapidly increased the nodes of cold-chain logistics, and preliminarily formed the Chinese herbal medicine warehouse networks. Various logistics equipment in China continued to develop towards automation and greening. China utilized the logistics public information platforms, logistics cloud platforms and dedicated logistics information platforms extensively in 2016. In terms of the standardization task in logistics, the establishment of many working groups of dedicated logistics standards assured the organization and staffing to push forward standardization of professional standards in China. At the same time, many fundamental and professional logistics standards were released. In particular, several logistics standards for hazardous goods were put into effect, providing powerful regulations for monitoring and supervising the logistics operations of hazardous chemicals.

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Chapter 3

Regional Logistics Market in China



Lan-Bing Li

Modern logistics is a foundational industry in a nation's economic and social development. Accompanying the characteristics of imbalanced growth inherent in China's regional economy, the development of China's logistics market also exhibits marked regional differences. As a result, it is significant to study regional logistics market development in China from the perspective of regional differences.

This chapter includes five sections. Section 3.1 introduces the differences and characteristics of the regional economic growth in China; Sect. 3.2 studies the size of market demands for regional logistics; Sect. 3.3 focuses on the development of infrastructures in regional logistics; Sect. 3.4 analyzes the major characteristics of China's regional logistics market; Sect. 3.5 presents a summary of the contents in the chapter.

3.1 Differences and Characteristics of Regional Economic Growth in China

Presently, China's economy is confronted with the pressure of both rapid downturn and the tasks of transformation and upgrading. Though the level of economic development declines evidently from the East Region to the West Region among the four

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major Regions¹ in China, they all face the major strategic task of transforming the economic growth pattern and making economic restructuring.

3.1.1 Differences in Overall Regional Economic Development Level

In 2016, China continued to implement the strategy of regional development, including: “Developing the Western Region,” “Rejuvenating the Northeastern Region,” “Raising the Central Region” and “Spearheading the Eastern Region,” so as to promote the nation’s balanced regional development. Against the background of weak global economic recovery, the economic growth in the Eastern, Central, and Western Regions still grew steadily. Nevertheless, gross product of the Northeastern Region showed a negative growth. See more details in Table 3.1.

Due to its location, industrial foundation, and institutional environment, the economy of the Eastern Region remains the most developed one in China. In 2016, GDP in Eastern Region amounted to 40.37 trillion RMB, accounting for 52.3% of China’s total. In the same period, GDP in the Central Region, Western Region and Northeastern Region reached 15.91 trillion RMB, 15.65 trillion RMB and 5.23 trillion RMB, respectively, accounting for 20.6, 20.3 and 6.8% of China’s total. The proportion of GDPs in China’s total for Eastern, Central and Western Regions grew by 0.7, 0.3 and 0.2 % points, respectively. It is worth noting that the proportion of GDP in China’s total for Northeastern Region dropped by 1.2 % points from that in 2015, due to its negative GDP growth.

3.1.2 Differences in Regional Industrial Structure

In the 12th Five-year Plan period, industrial structure in the four Regions in China all moved gradually from manufacturing industry to service industry. To be specific, the proportions of secondary industry in Eastern Region, Central Region, Western Region and Northeastern Region dropped from 48.9, 53.5, 50.9 and 52.3% in 2011 to 43.5, 46.8, 44.6 and 43.0% in 2015. In the same period, proportions of tertiary industry in the four Regions rose from 44.9, 34.1, 36.3 and 36.9% to 50.8, 42.4, 43.4 and 45.6%, respectively. In addition, compared with other Regions, the proportion of tertiary industry in the Eastern Region exceeded 50%, exhibiting an evident sign of service-orientation (Table 3.2).

¹Eastern Area: Beijing, Tianjin, Hebei, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Hainan; Central Area: Anhui, Jiangxi, Henan, Hubei, Hunan, Shanxi; Western Area: Inner Mongolia, Guangxi, Sichuan, Chongqing, Guizhou, Yunnan, Shaanxi, Ningxia, Gansu, Qinghai, Xinjiang, Tibet; Northeastern Area: Liaoning, Heilongjiang, Jilin.

Table 3.1 GDP in four major regions of China for 2011–2016

Region	GDP (trillion RMB)										Proportion of GDP in national total (%)							
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016
Eastern	27.14	29.59	32.48	35.01	37.30	40.37	52.04	51.32	51.20	51.15	51.60	52.32	52.04	51.32	51.20	51.15	51.60	52.32
Central	10.45	11.63	12.79	13.87	14.70	15.91	20.04	20.17	20.16	20.27	20.34	20.62	20.04	20.17	20.16	20.27	20.34	20.62
Western	10.02	11.39	12.70	13.81	14.50	15.65	19.21	19.75	20.02	20.18	20.06	20.28	19.21	19.75	20.02	20.18	20.06	20.28
Northeastern	4.54	5.05	5.47	5.75	5.78	5.23	8.71	8.76	8.62	8.40	8.00	6.78	8.71	8.76	8.62	8.40	8.00	6.78

Source Compiled from the *China Statistical Yearbook (2016)* and related data in the *2016 Statistical Bulletin of National Economic and Social Development of 31 provincial-level regions*

Table 3.2 Proportions of the three industries in China's four major regions (%)

Industry	2011				2015					
	Nationwide	Eastern	Central	Western	Northeastern	Nationwide	Eastern	Central	Western	Northeastern
Proportion of first industry	9.1	6.2	12.3	12.7	10.8	8.4	5.6	10.8	12.0	11.4
Proportion of secondary industry	50.5	48.9	53.5	50.9	52.3	44.4	43.5	46.8	44.6	43.0
Proportion of tertiary industry	40.4	44.9	34.1	36.3	36.9	47.2	50.8	42.4	43.4	45.6

Source: Compiles from the *China Statistical Yearbook (2016)* and *China Statistical Yearbook (2012)*

3.1.3 Regional Differences in Industrial Development

China's Regions differ conspicuously in industrial development. The Eastern Region holds the advantages both in structure and scale. First of all, the Eastern Region has achieved preliminary results in the supply-side structural reform of industries while accelerating its advanced manufacturing and high-tech industries. For instance, total added value in emerging industries in Tianjin, such as aviation and space, new materials, and biomedicine, accounted for 16.5% of the industrial total of the city, uplifting its industrial growth by 2.1 % points, or 0.9 % points higher than the previous year (Tianjin Statistics Bureau and National Bureau of Statistics, Tianjin Survey Office 2017). In comparison, the Northeastern Region, Central Region and Western Region all held onto petrochemical, energy processing, machinery manufacturing, mining and processing, and food processing as their dominant industries; the level of industrial structure of these latter Regions still lags behind that of the Eastern Region. Second, industrial scale in the Eastern Region ranks No. 1 in China. Take 2015 as an example, added value of industries in the Eastern Region reached 14.3 trillion RMB, accounting for 51.6% of the industrial total in China, or 2.43, 2.77, and 6.09 times more than those in the Central Region, Western Region and Northeastern Region, respectively. Table 3.3 shows more details.

3.1.4 Regional Differences in Foreign Trade

In the 12th Five-year Plan period, import and export volume in the four Regions dropped considerably due to the lethargic recovery of world economy and the tepid global demands. Growth rates of import and export volumes for the Eastern Region, Central Region, Western Region and Northeastern Region slid from 20.5, 39.2, 43.2 and 27.3% in 2011 to -7.6, 2.7, -13.0 and -24.2% in 2015. See more details in Table 3.4.

3.2 Size of Demands in China's Regional Logistics Market

In the 12th Five-year Plan period, demands in regional logistics market in China began to grow steadily. This section analyzes the size of regional logistics demand based on indicators such as freight volume, freight turnover, port cargo throughput, post and mail throughput in airport, and aircraft movements.

Table 3.3 Industrial added value and growth rate in China's four major regions

Region	Industrial added value (trillion RMB 亿元)					Growth rate of industrial added value (%)				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Eastern	11.85	12.59	13.30	14.07	14.32	15.8	6.3	5.6	5.8	1.8
Central	4.90	5.38	5.63	5.93	5.88	24.7	9.6	4.6	5.5	-0.8
Western	4.31	4.78	5.07	5.35	5.17	25.5	10.9	6.0	5.5	-3.4
Northeastern	2.29	2.44	2.55	2.59	2.35	22.5	6.9	4.2	1.6	-9.4

Source Compiled from the *China Statistical Yearbook (2016)* and related data in *2015 Statistical Bulletin of National Economic and Social Development of 31 provincial-level regions*

Table 3.4 Import and export volumes and growth rates in China's four major regions

Region	Import and export volume in the regions (100 billion USD)										Growth rate (%)				
	2010	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015	2013	2014	2015	
Eastern	26.06	31.39	32.71	34.83	35.41	32.73	20.5	4.2	6.5	1.7	-7.6	6.5	1.7	-7.6	
Central	1.17	1.63	1.93	2.20	2.47	2.54	39.2	18.9	13.5	12.5	2.7	13.5	12.5	2.7	
Western	1.28	1.84	2.36	2.78	3.34	2.91	43.2	28.6	17.4	20.4	-13.0	17.4	20.4	-13.0	
Northeastern	1.23	1.57	1.66	1.79	1.79	1.36	27.3	6.1	7.8	0.1	-24.2	7.8	0.1	-24.2	

Source Compiled from the *China Statistical Yearbook (2016)*, published by the National Bureau of Statistics of China

3.2.1 Freight Volume and Freight Turnover

3.2.1.1 Freight Volume and Freight Turnover Dropped Slightly in All Four Regions

In 2015, freight volumes in Eastern Region, Central Region, Western Region and Northeastern Region reached 14.9, 11.8, 11.1 and 3.0 billion tons, respectively. In the same period, freight turnovers in Eastern Region, Central Region, Western Region and Northeastern Region amounted to 8299.3, 3411.2, 2487.3 and 1468.3 billion ton-km, respectively. See more details in Table 3.5. In general, freight volume and freight turnover in these four Regions dropped slightly from that of 2014. Growth rates of freight volumes in Eastern Region, Central Region, Western Region and Northeastern Region stood at -1.2 , -9.3 , -3.8 and -9.3% ; growth rates of freight turnover in these regions were -2.6 , -10.4 , -3.9 and -6.8% . Table 3.6 shows more details.

3.2.1.2 Freight Volume and Freight Turnover in the Eastern Region Took the Lead

In 2011–2015, freight volume in the Eastern Region took 35–38% of China's total with its freight turnover taking about 50% of the total in China. In the same period, freight volume in the Central Region, Western Region and Northeastern Region took 28–30, 25–27 and 7–8% of the total in China, respectively, whose freight turnover took 20–24, 16 and 10% of China's total. See more details in Table 3.7.

3.2.2 Cargo Throughput at Port

3.2.2.1 Growth of Port Cargo Throughput in Coastal Areas Slowed Down

Coastal areas in the Eastern Region have many ports. In this region there are Shanghai Port, Shenzhen Port, Ningbo-Zhoushan Port, Guangzhou Port, Qingdao Port and Tianjin Port, which are among the Top ten container ports in the world. In 2011–2015, growth of cargo throughput in coastal areas in the Eastern Region had slowed down. In 2016, growth rate of port throughput grew more rapidly than the previous year; cargo throughput in ports above designated size stood at 3.3% in 2016 (for January to November), which was only 0.5% in 2015. Figure 3.1 shows more details.

Table 3.5 Freight volume and turnover in the four regions

Region	Freight volume (billion ton)					Freight volume (billion ton-km)				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Eastern	13.8	15.0	14.5	15.1	14.9	8122.4	8297.5	7101.5	8523.7	8299.3
Central	10.3	11.7	11.9	13.1	11.8	3019.4	3450.0	3541.2	3808.2	3411.2
Western	9.2	10.3	10.6	11.5	11.1	2332.7	2596.9	2431.0	2588.0	2487.3
Northeastern	3.0	3.3	3.1	3.3	3.0	1382.5	1516.2	1558.2	1575.1	1468.3

Source Compiled from the *China Statistical Yearbook (2012–2016)*, published by the National Bureau of Statistics of China

Table 3.6 Growth rate of freight volume and turnover in the four major regions

Region	Growth rate of freight volume (%)					Growth rate of freight turnover (%)						
	2011	2012	2013	2014	2015	2011–2015 annual growth rate	2011	2012	2013	2014	2015	2011–2015 annual growth rate
Eastern	11.7	8.3	-3.2	4.1	-1.2	1.9	12.6	2.2	-14.4	20.0	-2.6	0.5
Central	14.7	13.5	1.5	9.9	-9.3	3.5	16.4	14.3	2.6	7.5	-10.4	3.1
Western	17.1	11.8	3.2	8.1	-3.8	4.7	15.0	11.3	-6.4	6.5	-3.9	1.6
Northeastern	14.4	10.5	-4.3	5.7	-9.3	0.4	13.9	9.7	2.8	1.1	-6.8	1.5

Source Compiled from the *China Statistical Yearbook (2012–2016)*, published by the National Bureau of Statistics of China

Table 3.7 Proportions of freight volume and turnover in the four major regions

Region	Freight volume (%)										Freight turnover (%)									
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015					
Eastern	38.08	37.21	36.13	35.14	36.55	54.67	52.32	48.53	51.67	52.98	20.32	21.75	24.20	23.09	21.77					
Central	28.39	29.06	29.58	30.39	29.01	15.70	16.37	16.61	15.69	15.88	9.31	9.56	10.65	9.55	9.37					
Western	25.39	25.61	26.49	26.76	27.09	9.31	9.56	10.65	9.55	9.37	9.31	9.56	10.65	9.55	9.37					
Northeastern	8.15	8.12	7.79	7.70	7.35	9.31	9.56	10.65	9.55	9.37	9.31	9.56	10.65	9.55	9.37					

Source Compiled from the *China Statistical Yearbook (2012–2016)*, published by the National Bureau of Statistics of China

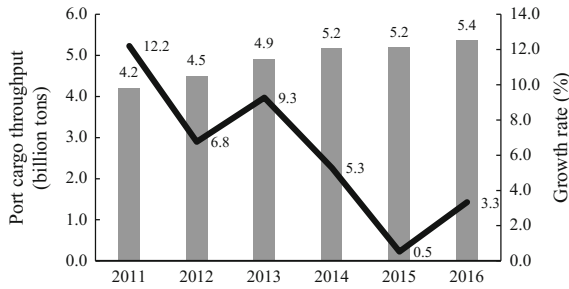


Fig. 3.1 Cargo throughput and growth rate in ports above designated size in the Eastern Region for 2011–2016 (January–November). *Source* Compiled from the Ministry of Transport statistics about cargo throughput in coastal ports above designated size in Eastern Region for 2010–2016 (January–November)

3.2.2.2 Cargo Throughput in Ports in the Central and Western Regions Grew Steadily

Besides the seaports in Guangxi along Beibu Bay, transportation in other ports in the Central and Western Regions is predominately inland river transportation. Relying on the Yangtze River, the Central Region has established a number of inland river ports above designated size, namely, Yichang, Jingzhou, Yueyang, Wuhan, Huangshi, Jiujiang, Anqing, Chizhou, Tongling, Wuhu, and Ma’anshan.

In the Western Region, a number of above-designated-size inland river ports, such as Chongqing, Peiling, and Wanzhou, have been formed; they rely on the Yangtze River upper stream, Xijiang River, Jialing River, and the Nanpan River, Beipan River and Hongshui River as the middle sea-bound channel in Southwestern Region (Bureau of Economic Adjustment in the NDRC and Modern Logistics Institute, Nankai University 2011). In 2011–2015, cargo throughput in ports in the Central and Western Regions grew steadily, rising from 1478.54 million tons in 2011 to 2021.02 million tons in 2015. See more details in Table 3.8.

3.2.3 Airport Cargo and Post Throughput and Aircraft Movements

In 2011–2016, civil aviation transportation in China developed vigorously. Airport cargo and post throughput and aircraft movements in different Regions in China kept a steady growth. See Fig. 3.2 and Table 3.9 for more details.

Airport cargo and post throughput of Eastern Region led those of all other Regions. Table 3.10 give more details. In 2015, airport cargo and post throughput of Eastern Region stood at 11,314 k-tons and that in the Central Region, Western Region and Northeastern Region was 954, 2305 and 531 k-tons, respectively.

Table 3.8 Cargo throughput of ports in the Central and Western Regions for 2011–2015 (In million tons)

Province	2011	2012	2013	2014	2015
Shanxi	–	0.18	0.24	0.16	0.17
Henan	2.02	2.36	2.02	2.09	2.21
Hubei	216.63	235.18	262.2	389.62	329.5
Hunan	210.64	218.67	231.44	253.22	290.53
Anhui	374.19	360.97	396.18	438.38	480.44
Jiangxi	235.57	252.71	262.43	309.75	326.75
Guangxi	234	269.35	293.36	310.79	314.93
Chongqing	116.06	125.02	136.76	146.65	157.5
Sichuan	70.75	77.05	81.95	91.59	95.64
Guizhou	10.92	11.58	9.84	10.14	13.17
Yunnan	4.61	3.9	4.95	5.46	7.19
Shaanxi	3.15	3.19	3.75	3.74	2.99
Total	1478.54	1560.16	1685.12	1961.59	2021.02

Source Compiled from the *Year Book of China's Ports (2012–2015)* and the *Statistical Bulletin of Guangxi Zhuang Autonomous Region for 2011*

Aviation transportation in Eastern Region had apparent advantage in efficiency over other Regions. Eastern Region, with 46.9% of total aircraft movements in China in 2016, finalized 74.9% of total cargo and post throughput in the country. In the same period, the Central Region, Western Region and Northeastern Region, having 14.2, 32.6 and 6.3% of the total aircraft movements, finalized 6.3, 15.3 and 3.5% of total cargo and post throughput in China.

Aviation transportation grew steadily in all four major Regions, with growth rates in Central Region, Western Region and Northeastern Region higher than that in Eastern Region. In 2011–2016, cargo and post throughput in Eastern Region, Central Region, Western Region and Northeastern Region grew by 4.5, 15.0, 7.3 and 4.7%, respectively, with growth rate of aircraft movements rising by 7.4, 7.8, 11.9 and 11.9%. See more details in Table 3.11.

3.3 Development of China's Regional Logistics Infrastructures

In the 13th Five-year Plan period, China will continue to push forward the building of logistics infrastructures. This section focuses on analyzing the development of regional logistics infrastructures from the perspectives of transport infrastructures and logistics parks.

Table 3.9 Aircraft movements and growth rate in airports of China's four major regions for 2011–2016

Region	Million movements										Growth rate of movements (%)									
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016		
Eastern	3.03	3.24	3.55	3.78	4.02	4.34	6.8	7.0	9.4	6.5	6.6	7.7	6.8	7.0	9.4	6.5	6.6	7.7		
Northeastern	0.33	0.4	0.45	0.5	0.55	0.58	12.8	22.6	11.6	10.8	10.2	5.2	12.8	22.6	11.6	10.8	10.2	5.2		
Western	0.72	1.94	2.24	2.54	2.77	3.01	9.5	13.1	15.1	13.6	9.2	8.6	9.5	13.1	15.1	13.6	9.2	8.6		
Central	0.9	1.01	1.08	1.12	1.22	1.31	8.2	12.5	6.6	3.4	8.9	7.8	8.2	12.5	6.6	3.4	8.9	7.8		

Source Compiled from related data in the *Statistical Bulletin of Nationwide Airports (2011–2016)*, published by the Civil Aviation Administration of China

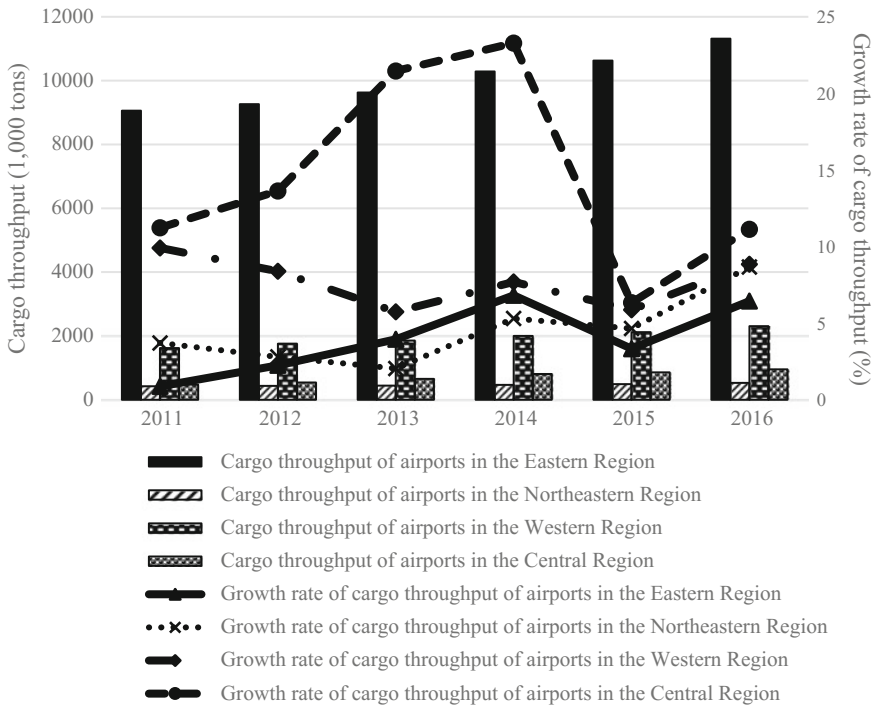


Fig. 3.2 Airport cargo and post throughput and growth rate in China’s four major regions. *Source* Compiled from related data in the *Statistical Bulletin of Nationwide Airports (2011–2016)*, published by the Civil Aviation Administration of China

Table 3.10 Cargo and post throughput and airport movements of China’s four major regions and their proportions in national total for 2016

Region	Cargo and post throughput		Aircraft movements	
	Total (thousand tons)	Proportion (%)	Total (thousand)	Proportion (%)
Eastern	11,314	74.9	4335	46.9
Northeastern	531	3.5	579	6.3
Western	2305	15.3	3012	32.6
Central	954	6.3	1312	14.2

Source Compiled from related data in the *2016 Statistical Bulletin of Nationwide Airports*, published by the Civil Aviation Administration of China

Table 3.11 Growth rate of civil aviation cargo and post throughput and aircraft movements in China's four major regions for 2011–2016

Region	Cargo and post throughput growth rate (%)										Growth rate of aircraft movements (%)				
	2011	2012	2013	2014	2015	2016	2011–2016 annual growth rate	2011	2012	2013	2014	2015	2016	2011–2016 annual growth rate	
Eastern	0.9	2.3	3.9	6.8	3.3	6.4	4.5	6.8	7.0	9.4	6.5	6.6	7.7	7.4	
Northeastern	3.7	2.8	2.0	5.3	4.7	8.7	4.7	12.8	22.6	11.6	10.8	10.2	5.2	11.9	
Central	11.2	13.6	21.5	23.3	6.3	11.1	15.0	8.2	12.5	6.6	3.4	8.9	7.8	7.8	
Western	9.9	8.4	5.7	7.7	5.9	8.8	7.3	9.5	13.1	15.1	13.6	9.2	8.6	11.9	

Source Compiled from related data in the *Statistical Bulletin of Nationwide Airports (2012–2016)*, published by the Civil Aviation Administration of China

3.3.1 Construction of Transport Infrastructures

3.3.1.1 Railway Construction

In 2016, China finalized 801.5 billion RMB worth of railway fixed-assets investments, constructed 3281 km of new railway lines and began 46 new projects, thus fulfilling the annual target of railway construction as specified in the Government Work Report, and making a good start for the 13th Five-year Plan. As of the end of 2016, mileage of operating railways in China reached 124,000 km, including more than 22,000 km of high-speed railways, the latter ranking No. 1 in the world.

Railway network density in China exhibits a descending order from the Eastern Region to the Central Region, the Northeastern Region and the Western Region. By the end of 2015, mileage of operating railways in the Eastern Region had reached 28,700 km with railway network density amounting to 3106 km/thousand km², or 4.5 times more than that in the Western Region, 1.18 times more than that in the Central Region, and 1.46 times more than that in the Northeastern Region. Tables 3.12 and 3.13 present more details.

Table 3.12 Operating railway mileage and growth rate in China's four major regions for 2011–2015

Year	Eastern		Central		Western		Northeastern	
	Total (km)	Growth (%)	Total (km)	Growth (%)	Total (km)	Growth (%)	Total (km)	Growth (%)
2011	21,692	6.6	21,041	1.3	36,307	1.0	14,236	1.0
2012	22,457	3.5	22,402	6.5	37,340	2.8	15,427	8.4
2013	24,806	10.5	23,230	3.7	39,585	6.0	15,523	0.6
2014	26,507	6.9	26,040	12.1	43,605	10.2	15,669	0.9
2015	28,743	8.4	27,162	4.3	48,005	10.1	17,060	8.9

Source Compiled from the *China Statistical Yearbook (2012–2016)*, published by the National Bureau of Statistics of China

Table 3.13 Railway network density of China's four regions for 2011–2015 (in km/thousand km²)

Year	National average	Eastern	Central	Western	Northeastern
2011	971	2367	2048	529	1807
2012	1017	2450	2180	544	1958
2013	1074	2707	2261	576	1970
2014	1165	2892	2534	635	1989
2015	1254	3106	2641	697	2122

Source Compiled from the *China Statistical Yearbook (2012–2016)*, published by the National Bureau of Statistics of China

3.3.1.2 Highway Construction

As of the end of 2015, total highway mileage in China reached 4,577,300 km with the mileage of express highways reaching 123,500 km. More details are shown in Table 3.14. Total mileage of highways in the Western Region ranks No. 1 in China. For example, in 2015, highway mileage in the Western Region reached 1,847,000 km, accounting for 40.4% of China's total. Nevertheless, density of highway network in the Western Region lagged far behind other Regions. See more details in Table 3.15. The Eastern Region has obvious advantages in highway network density, with 2015 highway network density and express highway network density standing at 121,470 and 3860 km/thousand km². In the same period, highway network density and express highway network density in the Western Region was only 26,827 and 641 km/thousand km².

3.3.1.3 Construction of Waterways

Marine shipping in China's Eastern Region is quite well-developed. Six ports in Shanghai, Shenzhen, Ningbo-Zhoushan, Qingdao, Guangzhou and Tianjin now rank among the Top Ten Container Ports in the world, which have become the major nodes in China's openness to the outside world, and have provided powerful support for China's export-oriented economic growth. See Table 3.16 for more details about the wharf length and the number of berths in ports above designated size in the coastal areas of Eastern Region for 2014–2015.

Waterway transportation in the Central and Western Regions is primarily by inland river transportation, which remains stable in recent years. Inland river transportation in the Central Region relies mainly on the Yangtze River system and the Huai River system, while waterways in the Western Region depend chiefly on the Yangtze River upstream system and the Pearl River system. See more details in Tables 3.17 and 3.18.

3.3.1.4 Construction in Aviation Transport

The Eastern Region has the most developed aviation industry in China, having 53 airports in 2016. Beijing Capital International Airport, Shanghai Pudong International Airport and Guangzhou Baiyun International Airport have become international hub airports. In the ranking of global airport passenger transport in 2016, Beijing Capital International Airport ranked No. 2, Shanghai Pudong International Airport ranked No. 9, and Baiyun International Airport ranked No. 14. In the same period, the Central Region, Western Region and Northeastern Region had 166 airports in total. Nevertheless, their airport density and the level of development still lagged behind that of the Eastern Region (Table 3.19).

Table 3.14 Mileage of highways and express highways in China's four regions for 2011–2015

Year	Indicator	Nationwide	Eastern	Central	Western	Northeastern
2011	Highway mileage (km)	4,106,387	1,008,734	1,123,499	1,622,784	351,372
	Express highway mileage (km)	84,946	27,910	22,468	25,310	9260
	Proportion of express highways (%)	2.1	2.8	2.0	1.6	2.6
2012	Highway mileage (km)	4,237,508	1,038,592	1,155,363	1,685,719	357,833
	Express highway mileage (km)	96,200	30,518	26,243	29,190	10,248
	Proportion of express highways (%)	2.3	2.9	2.3	1.7	2.9
2013	Highway mileage (km)	4,356,218	1,076,124	1,177,399	1,737,328	365,370
	Express highway mileage (km)	104,438	32,079	28,107	33,843	10,406
	Proportion of express highways (%)	2.4	3.0	2.4	1.9	2.8
2014	Highway mileage (km)	4,463,913	1,102,793	1,193,364	1,793,824	373,935
	Express highway mileage (km)	111,936	33,364	29,695	38,272	10,604
	Proportion of express highways (%)	2.5	3.0	2.5	2.1	2.8
2015	Highway mileage (km)	4,577,296	1,123,918	1,224,975	1,847,479	380,924
	Express highway mileage (km)	123,521	35,711	32,497	44,142	11,171
	Proportion of express highways (%)	2.7	3.2	2.7	2.4	2.9

Source Compiled from the *China Statistical Yearbook (2012–2016)*, published by the National Bureau of Statistics of China

Table 3.15 Highway and express highway network density in China's four regions for 2011–2015 (In km/thousand km²)

Year	Indicator	Nationwide	Eastern	Central	Western	Northeastern
2011	Highway network density	42,769	110,066	109,341	23,624	44,592
	Express highway network density	885	3045	2187	368	1175
2012	Highway network density	44,135	113,324	112,442	24,540	45,412
	Express highway network density	1002	3330	2554	425	1301
2013	Highway network density	45,371	117,419	114,587	25,291	46,369
	Express highway network density	1088	3500	2735	493	1321
2014	Highway network density	46,493	120,329	116,141	26,113	47,456
	Express highway network density	1166	3640	2890	557	1346
2015	Highway network density	47,460	121,470	119,097	26,827	47,379
	Express highway network density	1281	3860	3159	641	1389

Source Compiled from the *China Statistical Yearbook (2012–2016)*, published by the National Bureau of Statistics of China

Table 3.16 Wharf length and number of berths in ports above designated size in the coastal areas of Eastern Region for 2014–2015

Port	Wharf length (m)		Growth rate (%)	Number of berths		Growth rate (%)
	2014	2015		2014	2015	
Qinhuangdao	17,246	17,161	−0.5	92	92	0.0
Tianjin	35,954	38,729	7.7	162	173	6.7
Yantai	19,041	19,041	0.0	98	98	0.0
Qingdao	22,714	25,626	12.8	90	97	7.8
Rizhao	13,504	13,989	3.6	52	54	3.8
Shanghai	126,044	126,921	0.7	1220	1238	1.5
Lianyungang	14,653	15,608	6.5	62	64	3.2
Ningbo-Zhoushan	83,313	86,789	4.2	687	703	2.3
Shantou	9898	9898	0.0	92	92	0.0
Guangzhou	50,654	51,722	2.1	556	561	0.9

Source Compiled from the *China Statistical Yearbook (2015–2016)*, published by the National Bureau of Statistics of China

Table 3.17 Wharf length and number of berths in nine major inland river ports in the Central Region for 2014–2015

Port	Wharf length (m)		Growth rate (%)	Number of berths		Growth rate (%)
	2014	2015		2014	2015	
Yichang	7412	7412	0.0	47	47	0.0
Wuhan	24,785	24,910	0.5	280	280	0.0
Huangshi	8412	10,300	22.4	140	143	2.1
Jiujiang	18,828	18,828	0.0	191	191	0.0
Anqing	11,735	11,735	0.0	168	168	0.0
Chizhou	10,223	10,359	1.3	117	118	0.9
Tongling	6598	5726	−13.2	88	69	−21.6
Wuhu	13,452	14,076	4.6	144	142	−1.4
Ma'anshan	10,749	10,749	0.0	161	161	0.0
Total in Central Region	112,194	114,095	1.7	1,336	1,319	−1.3

Source Compiled from the *China Statistical Yearbook (2015–2016)* and *China Yearbook of Ports 2016*, published by the China Ports

Table 3.18 Operating mileage of waterways in inland rivers in the Western Region for 2015

Province	Operating mileage (km)	Province	Operating mileage (km)
Inner Mongolia	2403	Shaanxi	1146
Guangxi	5707	Gansu	914
Chongqing	4331	Ningxia	130
Sichuan	10,818	Qinghai	629
Guizhou	3664	Xinjiang	–
Yunnan	3939	Total in Western Region	33,681
Tibet	–		

Source Compiled from the data in *China Yearbook of Ports 2016*, published by the *China Ports*

Table 3.19 Regional distribution of China's airports

Region	2011	2012	2013	2014	2015	2016
Eastern	45	47	48	48	50	53
Central	25	25	27	30	31	33
Western	89	91	98	102	105	110
Northeastern	19	20	20	22	22	23
Total	178	183	193	202	208	219

Source Compiled from *CAAC Statistical Bulletin of Civil Aviation Airports Production for 2011–2016*, published by the Civil Aviation Administration of China

3.3.2 Construction of Logistics Parks

As of 2015, the Eastern Region, the Northeastern Region, the Central and Western Regions of China had 42, 9.1 and 48.9% of China's total logistics parks. Regional distribution of logistics park development in China shows an imbalanced feature. As far as the dynamic development trend is concerned, logistics parks in the Eastern Region increased from 260 in 2008 to 507 in 2015; the proportion of this number in the respective total number dropped from 54.7% in 2008 to 42% in 2015. The number of logistics parks in the Central and Western Regions rose from 167 in 2008 to 592 in 2015, with the proportion rising from 35.2% in 2008 to 48.9% in 2015. The number of logistics parks in the Northeastern Region rose from 48 in 2008 to 111 in 2015, with the proportion dropping from 10.1 to 9.1% (Table 3.20).

According to the *Survey Reports of Logistics Parks (Bases) in China for 2008, 2012 and 2015*, published by *China Federation of Logistics & Purchasing and China Society of Logistics*, the number of logistics parks in operation had risen considerably from 50 in 2006 to 857 in 2015. At the same time, the number of under-construction logistics parks increased rapidly after 2006. The growth rate slowed down since 2012. The number of under-construction logistics parks in 2015 was almost the same as that in 2012. See more details in Table 3.21.

Table 3.20 Number of logistics parks and their proportions in the Eastern Region, Central and Western Regions and Northeastern Region for selected years

Year	Eastern Region		Central and Western Region		Northeastern Region	
	Number	Proportion (%)	Number	Proportion (%)	Number	Proportion (%)
2008	260	54.7	167	35.2	48	10.1
2012	305	40.5	393	52.1	56	7.4
2015	507	42.0	592	48.9	111	9.1

Source Compiled from the *Survey Report of Logistics Parks (Bases) in China* for 2008, 2012 and 2015, published by *China Federation of Logistics & Purchasing and China Society of Logistics*

Table 3.21 Number and growth rate of operational and under-construction logistics parks for selected years (not including those in planning stage)

Year	In operation		Under construction	
	Number	Growth rate (%)	Number	Growth rate (%)
2006	50	–	65	–
2008	122	144	219	236.9
2012	348	185.3	241	10.1
2015	857	146.3	240	–0.4

Source Compiled from the *Survey Report of Logistics Parks (Bases) in China* for 2008, 2012 and 2015, published by *China Federation of Logistics & Purchasing and China Society of Logistics*

Table 3.22 Number and growth rate of in-operation logistics parks for selected years

Year	Eastern Region		Central and Western Region		Northeastern Region		Total	
	Number	Growth rate (%)	Number	Growth rate (%)	Number	Growth rate	Number	Growth rate (%)
2008	79	–	25	–	18	–	122	–
2012	205	159.5	117	368	26	44.4	348	185.2
2015	421	105.4	368	214.5	68	161.5	857	146.3

Source Compiled from the *Survey Report of Logistics Parks (Bases) in China* for 2008, 2012 and 2015, published by *China Federation of Logistics & Purchasing and China Society of Logistics*

The Eastern Region has had many logistics parks in operation, and has already generated certain financial and social benefits. As of 2015, of the total 857 operating logistics parks, there were 421 of them located in the Eastern Region, accounting for 49.1% of the total number; there were 436 of them located in the Northeastern Region, the Central and Western Regions, or 50.9% of the total. In 2015, the numbers of in-operation logistics parks in the Eastern Region, the Central and Western Regions and the Northeastern Region were 5.3 times, 14.7 times and 3.8 times more than those in 2008. See more details in Table 3.22.

3.4 Major Characteristics of China's Regional Logistics Market

Due to economic growth, industrial foundation, location and various other factors, logistics market in China exhibits evident regional characteristics. As the “Belt and Road” Initiative, the “Beijing-Tianjin-Hebei Coordinated Development” Plan, the “Yangtze River Economic Belt” and other regional strategies in China are implemented, China's regional logistics market has elevated its level of coordinated and integrated development. The Internet revolution has become the overriding force in innovation-driven development, which deeply influences the reforms and the upgrading of logistics industry. The “Internet + efficient logistics” emphasis has become the new engine which stimulates the logistics industry in the Eastern Region. Besides, the Central and Western Regions have facilitated the co-building of demonstration cities of transport hub. The Northeastern Region has also adopted some new measures to reduce its logistics cost and improve its efficiency.

3.4.1 *Coordinated Development of Regional Logistics Advanced*

First, in 2016 China issued the *Action Plan of Building Logistics Channels for 2016–2020*, which resolved to focus on building 11 logistics channels by 2020. These channels are the Northeastern Region logistics channel, the North-South coastal logistics channel, the Beijing-Shanghai logistics channel, the Beijing-HK-Macao (Taiwan) logistics channel, the Erenhot-Beibu Bay logistics channel, the Southwestern Region marine logistics channel, the Northwestern Region energy outbound-shipment and marine logistics channel, the Qinghai-Yinchuan logistics channel, the Continental Bridge logistics channel, the alongside-Yangtze River logistics channel, and the Shanghai-Kunming logistics channel. At the same time, the *Action Plan* also stipulated that China would establish 85 nodes along these logistics channels by 2020, consisting of 23 national pillar multimodal hubs (cities), 51 key regional multimodal hubs (cities) and 11 border land port hubs. As the *Plan* being carried out, China will enhance the integration of its regional distribution and logistics networks.

Second, coordinated development of logistics markets in some key regions had evidently heightened. For example, in December 2015, the NDRC and the Ministry of Transport jointly issued the *Plan of Coordinated Development of Integrated Transportation for Beijing, Tianjin and Hebei*, which proposed to push forward the network layout, intelligent management and integrated service of transportation in Beijing, Tianjin and Hebei, and to establish the regional transportation network with multiple nodes by 2020. Another example is the establishment of Beijing-Tianjin-Hebei Alliance of Logistics Standardization, jointly initiated by the logistics associations of Beijing, Tianjin and Hebei in November 2016. The Alliance would help the coordinated implementation of logistics standardization in the three areas, enhance

the matching and cooperation among upstream and downstream enterprises along the supply chains in the three areas, and build the platform for enterprises in the three areas to interact and cooperate with one another (NDRC, Department of Transportation Service 2016). The Alliance is intended to promote the standardization of regional logistics in the Beijing-Tianjin-Hebei areas to a new height.

3.4.2 Accelerated Development of “Internet+ Efficient Logistics” in the Eastern Region

Internet revolution has become the predominant force for innovation-driven development. In a holistic way, Internet technologies are influencing the economic and social progress, and pushing forward the development of logistics industry in a crucial manner.

In July 2016, the NDRC released the *Opinion of Implementing “Internet+ Efficient Logistics,”* which proposed the following development targets: (1) Extensively apply advanced information technologies in the logistics field, markedly improve the intelligence level of warehousing, transportation and distribution, and keep optimizing and innovating in ways of organizing logistics; (2) Make Internet-based new logistics technologies, models and business forms the new force of industrial development; establish the industrial management policy system that resonates with the development of “Internet+ efficient logistics;” (3) Form the intelligent logistics ecological system based on Internet, featuring openness and sharing, win-win cooperation, efficiency and convenience, greening and safety, so as to considerably improve the efficiency and benefits of logistics.

The Eastern Region has a solid foundation in logistics development, which can help drive the interactive integration of logistics with manufacturing, commerce and finance. For example, Tianjin took advantage of its port and relied on its key logistics parks to deepen the application of Internet in logistics, and to establish the intelligent modern logistics system. Also, Zhejiang, aiming to build the national demonstration region in “Internet+,” made great efforts to develop Internet-cored information economy, endeavored to establish (1) the “Logistics Information Highway” model spearheaded by the LOGINK; (2) the “Highway Port” and the “Urban Logistics Intelligent Dispatching Center” models, supported by the physical logistics platform; and (3) the fourth-party logistics platform model aiming at integrating the industrial and business resources.

3.4.3 The Central and Western Regions Sped up Co-building the Demonstration Cities of Transportation Hubs

In December 2016, with the intent of establishing comprehensive modern transportation hubs, the NDRC selected some cities in the Western Region to initiate the second batch of co-building demonstration task; it signed the framework agreement with Chongqing, Xinjiang Autonomous Region, Urumqi City, Yunnan Province, Kunming City, Sichuan Province, and Chengdu City to promote the establishment of demonstration cities for comprehensive modern transportation hubs in the Western Region.

First, the demonstration project will enhance the clustering and radiation intensity, and establish the Western Hub along the Chongqing Yangtze River Economic Belt. Namely, it will leverage Chongqing's advantage in rail-air and water-air joint transportation to build the comprehensive modern transportation hub featuring "zero transfer" of passenger transport and "zero reloading" of cargo transport, so as to advance the comprehensive air-ground transportation corridor along the Yangtze River Economic Belt. By coring on the Jiangbei International Airport it will build the international aviation hub; by focusing on hub ports such as Guoyuan it will build the railway-highway-waterway multimodal transportation base and the Yangtze River upstream shipping center; by building railway depots, and by enhancing the auxiliary facilities it will establish the comprehensive passenger transportation hub that integrates multiple transportation means.

Second, the project will push forward opening to the Western Region and enhance the supporting basis for Urumqi comprehensive transportation hub. Specifically, it will build the Urumqi modern comprehensive transportation hub and strengthen the capability in international influence and in resources and factors integration of the westward-opening frontier; it will speed up building the land-side airport comprehensive transportation hubs; it will build the cargo collection center of China-Europe freight trains and the international railway logistics parks to upgrade the collection-dispersion-distribution capability of the land ports; it will implement the construction of city rail transportation network, and build multiple large hub complexes based in transit stations.

Third, the project will take Kunming's location advantage to elevate its radiating capability in reaching South Asia and Southeast Asia. Specifically, it will build the Kunming Modern Comprehensive Transportation Hub to form the "1+2+X layout" ("1" refers to the Changshui Aviation Hub; "2" refers to the Kunming South Station and Kunming Station Railway Hub; "X" refers to several passenger and cargo transportation hubs), and foster Kunming's function as the "portal" and "hub" city.

Fourth, the project will serve the national strategy and optimize Chengdu as the comprehensive transportation hub for the Western Region. The specific measures include: steadily push forward the construction of city rail transportation network, speed up the construction of Chengdu international railway port and the container railway-highway-waterway multimodal transportation project, and build the regional international logistics center and main logistics hubs.

3.4.4 Northeastern Region Emphasizes Cost Reduction and Efficiency Enhancement in Its Transformation of Logistics Industry

In April 2016, the State Council issued the *Opinions about Rejuvenating the Old Industrial Bases in Northeastern Region*, which specified that it is mandatory for the Northeastern Region to be actively involved and participate in the Belt and Road construction strategy and work collaboratively towards mutual strategic trust, economic and trade cooperation, and cultural exchange; to enhance infrastructure connectivity with neighboring countries; and strive to build the Northeastern Region into a major window opening to the North, and a hub of cooperation with Northeastern Asia. Logistics, being the crucial industry, bears upon the operating efficiency and comprehensive competitiveness of regional economic system. Consequently, rejuvenating the old industrial bases in the Northeastern Region poses urgent requirements on the regional logistics industry to transform and upgrade, to reduce cost and improve efficiency.

First, Jilin Province has passed four measures to promote the transformation of its traditional cargo transportation so as to reduce cost and improve efficiency: (1) Push forward building of cargo transportation hub projects. Basing on development of its advantageous industries such as automobile, agricultural products, petrochemicals, pharmaceuticals, and machinery manufacturing, encourage logistics enterprises to build multimodal and regular distribution logistics parks around national and regional logistics nodal cities. (2) Firmly support the application of logistics information technology. Speed up building the Jilin transportation logistics information platform to provide communication platform for linking vehicles and goods. (3) Promote advanced means of organizing transportation. For instance, actively organize qualified logistics enterprises to apply for multimodal national demonstration projects to enhance the monitoring and guidance of the operations of the drop-and-pull pilot-testing enterprises. (4) Endeavor to break through the “Last Mile” in logistics. For example, build the pilot and demonstration projects of “passenger-cargo” depots in rural logistics.

Second, port logistics economy has become the new engine for rejuvenating the Northeastern Region. At present, Liaoning Province is focusing on building three comprehensive transportation channels, namely, the Liaoning-Manzhouli-Europe channel, the Liaoning-Mongolia-Europe channel and the Liaoning-Marine-Europe channel. The Liaoning-Manzhouli-Europe comprehensive transportation channel starts from Dalian Port and Yingkou Port, passes through Manzhouli in Inner Mongolia and Russia to reach Europe. The Liaoning-Mongolia-Europe channel comprehensive transportation starts with Jinzhou Port and Dandong Port, passes through Liaoning and Choybalsan Railway sea-bound channel in Mongolia before reaching Europe. The Liaoning-Marine-Europe channel starts with Dalian port and passes through the northeastern channel of the Arctic Ocean before reaching ports in Europe, thus creating a convenient, economical and efficient marine channel to reach Europe for the Northeastern Region, as well as China as a whole (Liu 2015).

Third, grain logistics has accelerated its pace of development. Heilongjiang, by developing the land-sea transportation for shipping grains from the Northern Region to the Southern Region of China, thereby reduced the cost of transporting grains. Several channels were adopted: (1) In September 2016, Heilongjiang opened cargo trains to Russia, which not only shortened the transport time, but also explored the new international channel to transport grains out of China's Northern Region (China Water Transport 2016). (2) Notable progress was made to build the special railway routes of bulk grains. (3) Extended nodal ports of grain transportation. At present, Jinzhou Port, Yingkou Port, Dalian Port, Dandong Port, Huludao Port and Panjin Port (which is under construction) are major marine shipping ports which link with Ningbo-Zhoushan Port in Zhejiang, China Merchants Port in Zhangzhou of Fujian and Huangpu Port in Guangdong, to provide service for grain-transporting ships from the North to the South (www.ce.cn 2016).

3.5 Summary

Over the past few years, coordination of regional logistics in China has been improved, growth rate of demands for regional logistics has slowed down, and construction of regional logistics infrastructures has kept a steady momentum. Modern logistics development in China is featured by regional imbalance, with the Eastern Region leading the Central Region, Western Region and Northeastern Region. Regional logistics development in China has shown several conspicuous features: the Eastern Region has accelerated the pace of "Internet+ efficient logistics" development; the Central and Western Regions have sped up the effort in co-building demonstration cities of transportation hub; the Northeastern Region has emphasized on cost reduction and efficiency enhancement in its logistics industry.

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Chapter 4

Third-Party Logistics Development in China



Ling Wang

As economic globalization speeds up and as modern IT develops rapidly, third-party logistics is growing rapidly worldwide, becoming an emerging industry that has revolutionary influence on world economic system. Level of third-party logistics development is now a major indicator which measures the competitiveness of a nation or region. Due to rapid growth of demands for social logistics and increasing needs for professional logistics services in China, third party logistics has seen notable development. Nevertheless, there still exist many predicaments with third-party logistics in China. As China's economy grows and various relevant policies are enacted, third-party logistics will respond with accelerated growth.

This chapter contains four sections. Section 4.1 gives an overview of third-party logistics; it describes the characteristics and operating procedures of third-party logistics, and the categorization of third-party logistics enterprises. Section 4.2 elaborates on the development environment for the third-party logistics in China from four perspectives, namely, the scale of logistics demands, the economic upgrading and transformation, the reforms of distribution channels, and the relevant policies. Section 4.3 discusses the current status of third-party logistics in China; it describes the size of China's third-party logistics market, the types of third-party logistics providers, the strengths and service capabilities of third-party logistics providers, and the coordinated development between third-party logistics providers and relevant industries. Section 4.4 analyzes the existing problems and the trend of third-party logistics in China.

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4.1 Overview of Third-Party Logistics

China's national standard *GB/T18354-2006 Logistics Terminology* defines Third-party Logistics, 3PL, as "the model of logistics service that is entrusted by the clients to provide them with dedicated or holistic logistics system design and system operations."¹ Because 3PL service is provided by signing termed contract with enterprises, it is also known as "contract logistics." Hence, 3PL providers refer to those enterprises that, by contractual agreement, undertake all or part of the logistics activities for the cargo-owner enterprises for specified compensation.

4.1.1 Characteristics of Third-Party Logistics

Third-party logistics service is regulated by contract. 3PL refers to logistics undertaken by the third parties apart from the suppliers and demanders of logistics services; it provides a series of logistics services in accordance with contract terms instead of the clients' impromptu requests.

Third-party logistics providers have closer partnership with clients. The business scope of 3PL providers involves sales plan, stock management, order plan, production plan and the entire production/operation process of the client enterprises. 3PL providers and client enterprises have a relationship which goes far beyond the ordinary buyer/seller relationship; they are closely connected to form a strategic partnership. The 3PL providers provide client enterprises with integrated, customized and professional logistics services. They not only provide warehousing and transport service, but also provide additional functions such as information management, courier selection, business consulting, stock replenishment, merchandise repackaging and labeling, freight agency, and even holistic one-stop service. Meanwhile, depending on the differences in business types, product features, business processes, and market conditions of the clients, 3PL providers may also have to design different service tactics to meet the client's specific needs.

4.1.2 Operating Procedure of Third-Party Logistics

With professional logistics management and technologies, 3PL providers undertake logistics activities between nodes along the supply chain and achieve the information exchange and efficient cooperation between them and other members along the supply chain, so as to reduce client's logistics cost and improve the operating efficiency of the supply chain. Figure 4.1 depicts the operating procedure of 3PL.

¹National standard GB/T 18354-2006 [EB/OL] *Logistics Terminology* by the Ministry of Transport. http://www.moc.gov.cn/zhuantizhuanlan/gonglujiaotong/shoufeigongluzmk/zhengcefagui/201508/t20150814_1863913.html.2015-08-14.

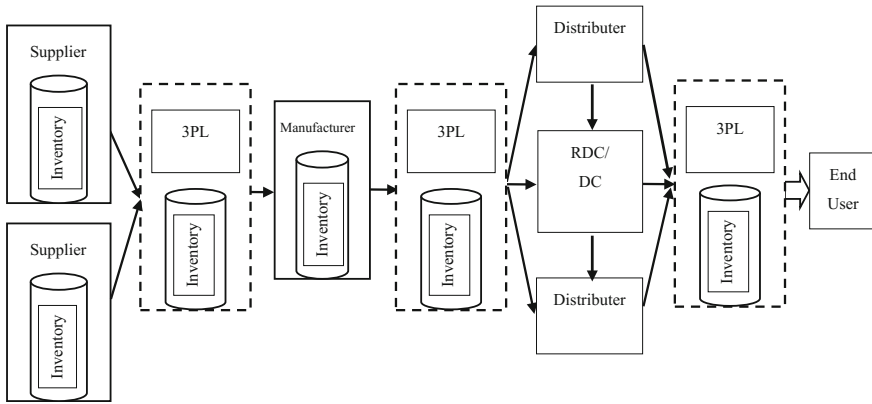


Fig. 4.1 Operating procedure of 3PL

On the upstream of the supply chain, 3PL providers undertake logistics activities such as transport, warehousing, loading and unloading from the suppliers to the manufacturers. After goods are manufactured, the 3PL providers are responsible for the whole process of sales logistics, i.e., storing goods in their own or rented warehouse facilities, and transporting goods to distribution centers using their own or rented vehicles. On the downstream of the supply chain, the 3PL providers continue to finish the terminal distribution of sales logistics by undertaking the logistics activities from distributors or retailers to the end users. In addition to the afore-mentioned logistics activities, the 3PL providers may also provide other information services and valued-added services.

4.1.3 Categorization of Third-Party Logistics Providers

3PL providers can be categorized according to different perspectives and basing on China’s actualities. According to the sources of enterprises, 3PL providers include four categories. They are: (1) those originated from traditional warehousing, transport and freight agency enterprises; (2) those originated from logistics departments in industrial or commercial enterprises; (3) those established by linking logistics resources in various enterprises; (4) those newly-established 3PL providers.

Based on the ownership, 3PL providers include four categories. They are: (1) those state-owned 3PL providers; (2) those private 3PL providers; (3) those foreign-funded 3PL providers; (4) those Joint-ventured 3PL providers.

From the perspective of services provided, 3PL providers can be classified into three categories. They are: (1) those focusing on transport service; (2) those focusing on warehousing service; (3) those focusing on comprehensive service.

Depending on the type of assets possession, 3PL providers include two categories. They are asset-based and non-asset-based 3PL providers.

4.2 Environment for China's Third-Party Logistics Development

As China's national economy grows steadily, its demand for logistics keeps expanding, the proportion of logistics outsourcing of its industrial and commercial enterprises continue to rise, which have generated massive demands for the 3PL market. At the same time, China's economy has continually sped up its transformation and upgrading endeavor; its distribution channels have embraced reforms, which not only engender higher requirements for professional logistics services but also push forward rapid escalation of the demands for livelihood logistics. China's government has been actively instituting policies and measures to support and encourage 3PL development, and to foster an affirmative policy environment.

4.2.1 Logistics Demands Keep Expanding; Proportion of Logistics Outsourcing Continues to Rise

Rapid growth of China's national economy and economic aggregate provides its 3PL with vast development space. In 2011–2016, China's GDP grew at an annual average of 7.7%, which reached 74.4 trillion RMB in 2016; the industrial added value climbed to 29.62 trillion RMB in 2016, achieving an annual growth rate of 7.6%; total retails of consumer goods exceeded 33.2 trillion RMB in 2016, equaling an annual growth rate of 11.0%.² Thanks to the rapidly-growing logistics demands, total value of social logistics goods expanded from 158.5 trillion RMB in 2011 to 229.7 trillion RMB in 2016, with an annual average growth rate at 8.6%.³

As overall logistics demand continues to expand, more and more industrial and commercial enterprises outsource their logistics business to 3PL providers, in order to focus on their core business and speed up the response to the market, thus creating effective demands for the development of the 3PL industry. According to the *Survey Report on Major Logistics Providers in China*, the proportion of logistics cost paid to external parties by industrial, wholesale and retail enterprises in their total logistics

²Source: Compiled from the *China Statistical Bulletin of National Economic and Social Development (2011–2016)*, published by the National Bureau of Statistics of China. Total value refers to the current price of each year and growth rates are computed based on constant price of the same base year.

³Source: Compiled from the *National Logistics Operations Bulletin for 2011–2016*, published by the National Development and Reform Commission, the National Bureau of Statistics, and the China Federation of Logistics and Purchasing. Total value refers to the current price of each year and growth rates are computed based on constant price of the same base year.

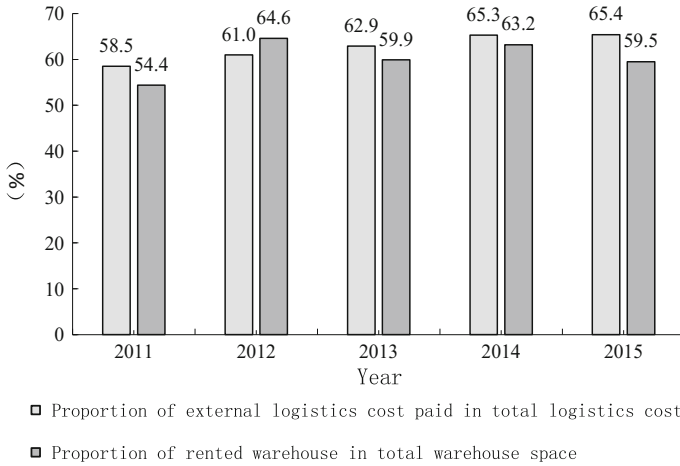


Fig. 4.2 Proportion of external logistics cost paid by industrial, wholesale and retail enterprises in China in their total logistics cost, and proportion of rented warehouse in total warehouse space for 2011–2015. *Source* Compiled from the *Survey Report on Major Logistics Providers in China in 2012–2016*, released by the NDRC and China Federation of Logistics and Purchasing

cost rose from 58.5% in 2011 to 65.4% in 2016, rising by 1.7 percentage points on an annual basis; the proportion of rented warehouse in total warehouse space increased from 54.4% in 2011 to 59.5% in 2015, rising by 1.3 percentage points per year; the proportion of outsourced freight in total freight rose from 49.8% in 2008 to 80.6% in 2015, rising by 4.4 percentage points per year. Figure 4.2 shows the proportion of external logistics cost paid by industrial, wholesale and retail enterprises in China in their total logistics cost for 2011–2015, and the proportion of rented warehouse in total warehouse space for 2011–2015

Figure 4.3 gives the proportion of outsourced freight in total freight in major industrial, wholesale and retail enterprises in China for 2008–2015.

4.2.2 Economy Accelerates Upgrading and Transformation; Requirements for Professional Logistics Services Raised Considerably

In recent years, China has hastened the upgrading and transforming of its manufacturing industry, and has become the world’s largest and most competitive manufacturer. At present, China’s manufacturing industry is transitioning from the Industry Era to the Information Era and then to the Data Era. Lean manufacturing, mass-customized production, and personalized production are becoming mainstream production models. Because manufacturing logistics is closely aligned

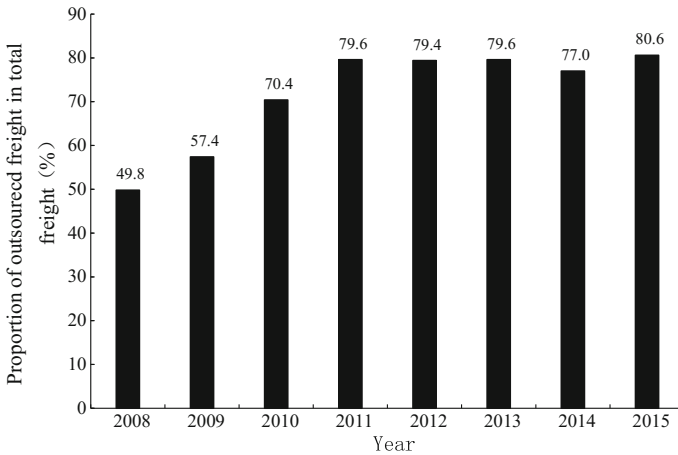


Fig. 4.3 Proportion of outsourced freight in total freight in major industrial, wholesale and retail enterprises in China for 2008–2015. *Source* Compiled from the *Survey Report on Major Logistics Providers in China in 2009–2016*, released by the NDRC and China Federation of Logistics and Purchasing

with the manufacturing process, different production processes call for the support of different manufacturing logistics service models. Logistics in manufacturing enterprises encompasses five closely-knitted processes, namely, supply logistics, production logistics, sales logistics, recycling logistics, and waste logistics. Consequently, manufacturing logistics is highly professional and entails to complex operations, thus engendering urgent demands for professional logistics services.

Meanwhile, consumption in China is also being upgraded swiftly. Since 2012 when for the first time total consumption value contributed over 50% in national GDP, consumption's contribution to economic growth has kept rising and reached 64.6% in 2016, continuing to serve as the foremost stimulus for China's economic growth. Accompanying the fast expansion in consumption scale, consumption quality is also upgraded commensurately. Consumers are having greater demands for FMCG logistics, cold-chain logistics and cross-border e-commerce logistics. Because demands for consumption logistics have greater requirements in terms of logistics timing, quality and safety, more professional logistics services are needed.

4.2.3 Reform of Distribution Channels Sped up; Demands for Livelihood Logistics Emerged Promptly

Distribution industry in China has made great progress in recent years. Transaction scale continues to expand, new business forms keep emerging, and modern distribution channels evolve swiftly. The distribution industry has become the fundamen-

tal and leading industry for the national economy. First, chain commerce in China develops rapidly. In 2015, sales volume of chain retailers in China reached 3.5 trillion RMB, with a national total of 209,800 shops, 2,481,000 employees, 168,624,000 m² of operating space, and jointly-delivered goods amounting to 233,799 billion RMB. Compared with those same indicators in 2006, they had increased by 136.8, 62.7, 32.6, 87.8 and 121.3%, respectively. Joint delivery represents an essential aspect of the core competitiveness of the chain enterprises. Because chain delivery operations are more complex and have higher requirements for logistics facilities, information technology, and management level, more professional 3PL services are required.

Second, due to the rapid growth of Internet IT and the rise of a host of representative platforms such as JD, Taobao and TENCENT, Platform Economy has come into being which overthrows the development models of traditional industries. The Platform Economy has ushered in multiple business models, such as B2B, B2C, C2C and O2O. Sales volume of e-commerce in China rose rapidly from 5.67 trillion RMB in 2013 to 9.17 trillion RMB in 2015, rising by 27.2% annually; e-commerce purchase values increased from 3.47 trillion RMB in 2013 to 5.35 trillion RMB in 2015, rising by 24.2% on an annual basis. The incessant expansion of e-commerce market and the growth spurt of online shopping generate huge demands for the emerging livelihood logistics. Demands for livelihood logistics are by nature fragmented; as such, it becomes urgent to establish better, more convenient, efficient and safer consumer goods logistics distribution system. Livelihood logistics thus triggers tremendous demands for 3PL.

4.2.4 Successive Issuance of Supporting Policies Enhances the 3PL Development Environment

China's government had successively issued various new policies to support the 3PL development. These policies call for the following key actions: (1) promote the development of private logistics providers and establish the multiple-layer, private and professional logistics service network system; (2) encourage industrial manufacturers to peel off their logistics business, encourage corporate logistics to transform towards social logistics, and enhance the integration between manufacturing industry and the 3PL industry; (3) encourage logistics service to develop towards professional logistics and improve the service quality of professional logistics, such as logistics for commerce and trade, manufacturing industry, fresh and live agricultural produce, pharmaceuticals, tobacco, dry and bulk goods, publications, and hazardous chemicals; (4) encourage logistics providers to integrate and optimize the dispersed logistics resources, and encourage the traditional warehousing, transport logistics providers to extend services along the upstream and downstream of supply chain; (5) push forward the 3PL to make synergetic innovation and interactions with e-commerce platforms and Internet finance; (6) refine the 3PL standards; (7) encourage private sector to invest in 3PL services and substantiate the supporting policies

on land use and finance; (8) encourage the development of new business models and forms, support building of logistics information platforms, and support development of Non-Truck Operating Common Carrier, big data, and intelligent logistics founded on the Internet platforms; (9) improve the internationalization level of 3PL, support logistics providers to establish partnership, and build logistics system that serves cross-border e-commerce and global trade.

4.3 Current Status of Third-Party Logistics in China

As logistics demands grow rapidly and policy environment keeps improving in China, its 3PL market size expands steadily. Logistics providers are becoming more diverse and their strength markedly elevated. Logistics services are expanded rapidly, capability in professional and customized services are enhanced, while the logistics service value chain is notably extended. At the same time, 3PL providers are hastening its coordinated development with relevant industries, and innovating service models and industrial forms.

4.3.1 *Market Size of Third-Party Logistics Ranks No. 1 in the World*

Since the implementation of the 12th Five-year Plan for Economic and Social Development, total expense of social logistics in China have sustained a growing momentum, increasing annually by an average of 5.7% during 2011 and 2016. In 2016, total expense of social logistics reached 11.1 trillion RMB. Figure 4.4 shows the total value and growth rate of social logistics for 2011–2016.

As total expense of social logistics continues to climb, revenue for China's logistics industry sustains a steady growth. In 2014–2016, revenue of logistics industry in China rose by 5.5% annually and reached 7.9 trillion RMB in 2016, accounting for 71.2% of the total expense of social logistics in China. Figure 4.5 gives the revenue and growth rate of logistics industry in China for 2014–2016.

To date, China does not have explicit statistics on 3PL market size. According to the estimate made by Armstrong & Associates, Inc.,⁴ China's 3PL market size accounted for about 10% of the total expense of social logistics in China; this implies China's 3PL revenue reached 162.8 billion USD, ranking No. 1 in the world and is 1.6 billion USD higher than that of the United States. This revenue accounts for 55.7% of the total 3PL revenue of Asia-Pacific region and 20.6% of the total global 3PL revenue. See Fig. 4.6 for 3PL revenues for certain countries and regions in 2015.

⁴Armstrong & Associates, Inc. Global logistics costs and third-Party logistics revenues [EB/OL]. <http://www.3plogistics.com/3pl-market-info-resources/3pl-market-information/global-3pl-market-size-estimates/>. 2016-10-03.

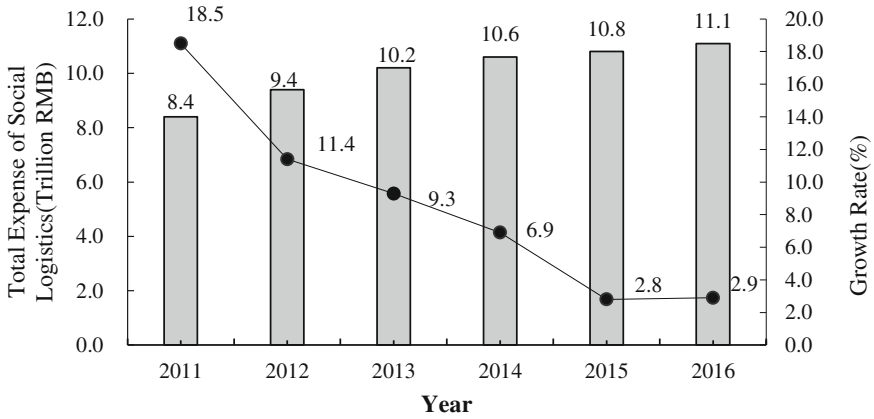


Fig. 4.4 Total expense and growth rate of social logistics in China for 2011–2016. *Source* Compiled from the *National Logistics Operations Bulletin for 2011–2016*, published by the National Development and Reform Commission, the National Bureau of Statistics, and the China Federation of Logistics and Purchasing

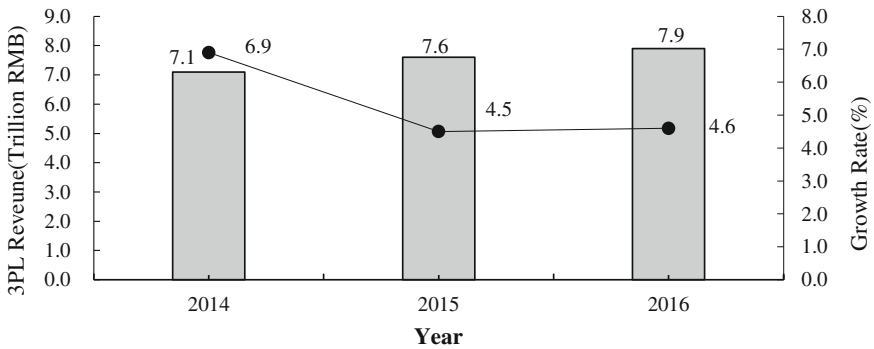


Fig. 4.5 Revenue and growth rate of logistics industry for 2014–2016. *Source* Compiled from the *National Logistics Operations Bulletin for 2014–2016*, published by the National Development and Reform Commission, the National Bureau of Statistics, and the China Federation of Logistics and Purchasing

Given that China’s 3PL market size accounts for about 10% of its total expense of social logistics (which is 11.1 Trillion RMB for 2016), then it would have an estimated value at around 1.11 trillion RMB for 2016.

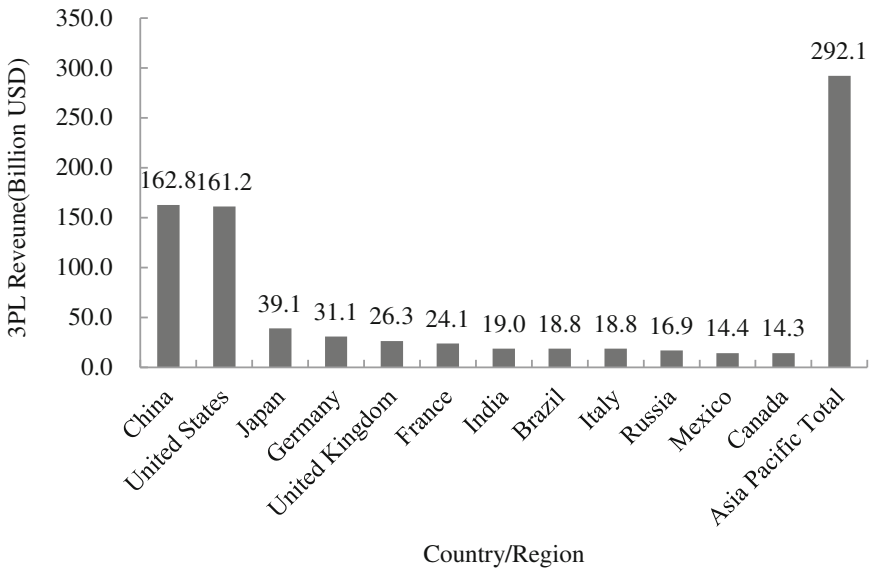


Fig. 4.6 3PL revenues in certain countries and regions in 2015. *Source* Compiled from the *Global logistics costs and third-Party logistics revenues*, published by Armstrong & Associates, Inc. in 2017

4.3.2 *Third-Party Logistics Providers Are Becoming More Diverse*

China has numerous 3PL providers, and the market participants are becoming more diverse. In terms of the genre of the enterprises, most of 3PL providers in China are originated from traditional transport, warehousing or freight agency enterprises, such as SINOTRANS and CMST Development. These enterprises take the dominant role in the 3PL market. Another type of 3PL providers is those that were previously internal logistics departments within industrial and commercial enterprises, such as RRS Logistics, which was formerly the logistics branch of Haier. Some 3PL’s are formed by pooling the logistics resources of several enterprises. For instance, COSCO Shipping Logistics Co., Ltd. was established by regrouping China Ocean Shipping Group, SCL, and COSCO Shipping Agency Co., Ltd. There are also some newly-established 3PL providers, such as China Logistics Co., Ltd. and China Railway Express Co., Ltd.

In terms of ownership, there are a number of state-owned 3PL providers, such as China National Foreign Trade Transportation Corporation, COSCO, China National Materials Storage and Transportation Corporation, China Postal Express & Logistics, and China Merchants Logistics Holding Co., Ltd. These state-owned 3PL giants not only own powerful logistics network resources in China, but also are gradually exploring the international markets to emerge as transnational logistics providers.

Meanwhile, there are also a large number of private 3PL providers such as Deppon Logistics Co., Ltd. and P.G. Logistics, which have grown rapidly and become major forces in China's logistics market. In addition, there are foreign-funded 3PL providers, such as DHL Global Forwarding (China), and UPS Supply Chain Solutions, and joint-ventured 3PL providers, such as Kerry Logistics (China) Co., Ltd., which have become leaders in comprehensive logistics service and supply chain management due to their advanced expertise and quality service in logistics and supply chain management.

In terms of service functions, some enterprises focus on transport business, which are typified by the Zhengzhou Transport Group and the Fujian Transport Group. Some enterprises focus on warehousing service, such as CMST Development and Shanghai Guochu Logistics. However, more and more enterprises are expanding their service functions to become comprehensive type of 3PL providers, such as Yuan Cheng Logistics and China Xinxing Transportation Logistics.

In terms of assets type, most of 3PL providers are asset-based enterprises, which are typified by China Logistics Co., Ltd., COSCO Logistics Co., Ltd. and SINO-TRANS Shandong Co., Ltd. Though China has only few non-asset-based 3PL providers, they have been growing rapidly in recent years; representative ones are Eternal Asia and SJET. This type of 3PL enterprises focus chiefly on knowledge (intelligence) assets, they fully integrate the social resources to provide integrated supply-chain services.

4.3.3 Strength of Third-Party Logistics Providers Improves Considerably

After years of growth, a number of 3PL providers have emerged in China, featuring large size and solid strength. SINOTRANS was among the Top Ten 3PL firms in the world for the past three consecutive years. According to the ranking of global 3PL providers published by Armstrong & Associates, Inc., the operating revenue of SINOTRANS ranked No. 10 in 2013, becoming the first enterprise of China on the list of Top Ten. It ranked No. 8 on the list in 2014 and 2015, with total revenue of 731.4 million USD for 2015. SINOTRANS integrates essential services, including marine shipping, air transport, highway and railway transport as well as international express delivery, shipping agency, warehousing and distribution, and berth service, to provide customers with end-to-end whole-process supply-chain solutions and one-stop service, thus becoming one of the world-leading providers of integrated logistics services.

COSCO Shipping Logistics combines the gainful resources of the former COSCO Logistics, CSL and China Shipping Agency, and holds the record in China for transporting the heaviest, widest, longest and tallest large-piece cargos. The company has established branches in 30 provinces/municipalities/autonomous regions in China, as well as 17 countries/ regions in the world. Globally, it has more than 500 sales and

service outlets in the world to form a service network that covers China and sprawls all over the globe, thus becoming the leading international 3PL provider in China.

P.G. Logistics, the first corporate group registered in the State Administration for Industry and Commerce of the People's Republic of China in the name of logistics firm, has established branch companies, subsidiaries, and offices in more than 80 cities in China, and 22 large modern logistics bases in 16 central cities of the nation, thus forming a countrywide operations network and information network. It has established strategic alliance with several Fortune 500 companies including Red Bull, UniLever, P&G, Johnson & Johnson, and Samsung, as well as some national large manufacturers, thus becoming a renowned 3PL provider in China.

4.3.4 Service Scope of Third-Party Logistics Providers Expands Swiftly

Third-party logistics firms in China have extensive scope of services. In particular, some large and comprehensive 3PL providers have gradually expanded from singular service scope to diverse service scope, thus are capable of providing professional and high-efficiency integrated supply-chain logistics services. The principal service scope of 3PL providers encompasses fields in FMCG, energy, food, automobile manufacturing, electronic communication, and high-tech. For example, SF Express, as the largest private express delivery enterprise in China, while enhancing its express delivery operations, is also actively diversifying its services. For clients in industries like e-commerce, food, pharmaceuticals, automotive parts and components, and electronics, it has developed tailored one-stop supply-chain solutions as well as provided them with comprehensive financial services such as payment, financing, and price warranty. See Table 4.1 for the service scope of some 3PL providers in China.

4.3.5 Third-Party Logistics Providers Keep Enhancing Capabilities in Professional and Customized Service

Along with the expansion of their service scope, 3PL providers in China are also enhancing their capability in professional service. Particularly in the fields of automotive logistics, home appliance logistics, cold-chain logistics, and engineering logistics, China has seen the rise of a number of 3PL providers having notable professional service competency and prominent brand influence. Table 4.2 gives a list of representative 3PL providers in certain professional logistics fields in China.

For automotive logistics, ANJI Automotive Logistics is the first joint-ventured automotive logistics firm in China which provides integrated logistics solutions for vehicles, parts and components. To date, it has developed into China's largest third-party automotive logistics supplier. Tong Fang Global (Tianjin) Logistics

Table 4.1 Service scope of some 3PL providers in China

Enterprises	Principal scope of service
SINOTRANS Limited	Engineering, energy, chemical industry, automobile and parts and components, FMCG and retail, expo and non-trading goods, and cold-chain logistics
COSCO Shipping Logistics	Home appliance manufacturing, equipment manufacturing, commerce and trade circulation, iron and steel, energy, petrochemicals, electronic information, food, forestry and cold-chain logistics
SF Express	FMCG, food and beverages, pharmaceuticals, electronic information, automobile and parts and components, e-commerce, and cold-chain logistics
China Merchants Logistics Holding	FMCG, cold-chain logistics, petrochemicals, machinery manufacturing, retail, and expo
Yuan Cheng Logistics	Food and beverages, textile and apparels, energy and petrochemicals, daily-use chemicals, home appliance manufacturing, and cold-chain logistics
Shenzhen Tempus Logistics Holding	Automobile and parts and components, energy, liquor, and cold-chain logistics

Source Compiled from information released on respective corporate websites

Table 4.2 Representative 3PL providers in some professional logistics fields in China

Fields	Representative enterprises
Automotive Logistics	ANJI Automotive Logistics Co., Ltd., Tong Fang Global (Tianjin) Logistics Co., LTD., FAW Logistics Co., Ltd., Chongqing Changan Minsheng APLL Logistics CO., LTD., Changjiu Logistics, P.G. & Foton Logistics, Guangzhou Fengshen Logistics, CSC RORO Logistics, China Railway Special Cargo Services CO., LTD., Changchun FAW International Logistics, and GEFCO Global Logistics (China)
Home appliance logistics	HUASHANG Logistics, COSCO Shipping Logistics, and RRS Logistics
Cold-chain logistics	ROKIN Logistics, Shuanghui Logistics, Xianyi Supply Chain, Speed Fresh, ZM Logistics, SF Express, HAVI Logistics, ZHONGRONG Logistics, DAH CHONG HONG Holdings, and China Merchants Americold (Hong Kong)
Engineering and project logistics	COSCO Shipping Logistics and Beijing Huayou International Logistics

Co., Ltd. provides first-class logistics service for vehicles, parts and components for the joint-ventured facilities of FAW and Toyota, GAC Group and Toyota, and solely-owned Toyota operations in China.

In terms of appliance logistics, COSCO Shipping Logistics Warehousing Distribution Co., Ltd. provides extensive, high-quality and precise warehousing services for domestic and overseas home appliance brands, including Aucma, Electrolux, Midea, MEILING, Konka, TCL, Whirlpool, Haier, Siemens, and Hisense Kelon. In terms of engineering project logistics, COSCO Shipping Logistics, as the pacesetter of engineering logistics industry, provides industrial enterprises with whole-process logistics services for moving equipment and materials needed by engineering projects, from production sites to designated project sites. Its services cover segmented markets of power, petrochemicals, aviation, optoelectronics, metallurgy, construction materials, and machinery manufacturing, with service areas expanded to many regions such as South Asia, Southeast Asia, Central Asia, Middle East, Africa, Europe, South America and Oceania. It engages in international logistics service in more than 70 countries and regions in the world with more than 70% overseas projects.

As for cold-chain logistics, ROKIN Logistics, since 2004, has started to offer cold-chain logistics service. It has invested 150 million RMB to purchased fixed assets and building infrastructures such as refrigerated warehouses and refrigerator trucks. As one of the leading enterprises in China with ample cold-chain logistics facilities and equipment, ROKIN Logistics engages in low-temperature logistics service needed by such industries as food, supermarket, retail, restaurant, hospital and electronics.

In addition, some enterprises are also able to provide customized logistics services for clients. Shanghai Huayi Tianyuan Chemical Logistics Co., Ltd., when merging with the world-class manufacturer Bayer, deems imbedded logistics services as one of its principal business. It places the front-end packaging service within the client's factory and closely links with the production line while integrating with multiple logistics functions to customize the logistics operations and management for the client.

4.3.6 Third-Party Logistics Providers Keep Extending Service Value Chains

In recent years, 3PL providers in China keep expanding their logistics service functions to the upstream and downstream of the supply chain to provide diverse, integrated and holistic services for clients. Many 3PL providers in China were transformed from traditional transport and warehousing enterprises; as such, comprehensive transport and warehousing logistics still constitute the fundamental logistics services of these 3PL providers. As enterprises enhance their IT competency, logistics information service has become an essential service function of 3PL providers. Besides, more and more 3PL providers are actively developing innovative services and conducting value-added logistics services. Some 3PL providers provide

logistics and supply-chain financial service, offering “logistics + finance” service to their partners; some providers, in meeting the needs of their core client enterprises in procurement and supply management, provide integrated supply chain management services. Table 4.3 exhibits the services of some 3PL providers in China.

4.3.7 Third-Party Logistics Providers Speed up Coordinated Growth with Relevant Industries

4.3.7.1 Third-Party Logistics in Coordinated Development with Manufacturing Industry

In 2009, China issued the *Plan of Adjusting and Rejuvenating Logistics Industry*, which is the first policy of its kind in China. The project of “Coordinated Development of Manufacturing Industry and Logistics” was listed as one of the *Plan’s* major programs. Thereafter, the Central Government and local governments have issued various relevant policies to encourage coordinated development of manufacturing industry and logistics. The *Medium and Long Term Development Plan of Logistics Industry 2014–2020* proposes to implement the logistics for manufacturing industry and supply-chain management project. Driven by the policies of coordinated development of logistics and manufacturing industry, many 3PL providers are actively collaborating with manufacturers, reaping the coordinated effect by optimizing processes, improving efficiency and making model innovations. For example, China Railway Material Group Northeast Co., Ltd., Fushun New Steel and many other steel manufacturers adopt the tactics of supply-chain joint stock management to help the steel manufacturers effectively reduce the cost of fund usage.

4.3.7.2 Coordinated Development of Third-Party Logistics with Trade and Commerce Circulation

When consumption market is experiencing profound reforms and e-commerce is growing rampantly in China, 3PL providers have accelerated their coordinated development with trade/commerce circulation enterprises. JC Trans of Dalian has overseas agency network all over the world and long-term partnerships with many air express delivery companies in China. When clients place orders on e-commerce platforms of exporting and importing goods, JC Trans collects goods from overseas buyers and transports goods to China in a safe, convenient and low-cost manner. After the goods clear the Customs, they are delivered to clients via express delivery. JC Trans helps e-commerce enterprises save costs on logistics, Customs clearance, and taxes, to ensure the transport process is efficient, economical and convenient. Besides, 3PL providers are also actively expanding the cross-border e-commerce logistics business and partnering with e-commerce enterprises. Deppon joined hands with Amazon, the

Table 4.3 Services of some third-party logistics providers in China

Company	Comprehensive transport	International multimodal	Warehousing logistics	Shipping agency	International express	International cargo agency	Supply-chain management	Logistic (supply chain) finance	Logistics information service	Cold-chain logistics	Comprehensive logistics platform (logistics town)	Engineering and project logistics
SINOTRANS Limited	✓		✓	✓	✓	✓	✓		✓			
COSCO Shipping Logistics	✓		✓	✓		✓	✓	✓	✓			✓
SF Express	✓		✓		✓		✓	✓	✓	✓		
Yuan Cheng Logistics	✓		✓				✓	✓	✓	✓	✓	
JCTRANS	✓		✓		✓	✓	✓	✓	✓			
KERRY Logistics	✓		✓		✓	✓	✓		✓			
Zhenhua Logistics	✓	✓	✓	✓			✓		✓			

Source Compiled from information released on the respective company's website

world-class e-commerce giant, to become the partner of Amazon's "Global Selling." "FBA First Base Merchandise Warehousing Business," the product developed by Deppon to enter the field of cross-border e-commerce logistics, is designed to provide one-stop door-to-door service for Amazon's sellers involved in the "Global Selling" program. The program provides the sellers solutions such as express delivery, special route of direct air mail, maritime shipping container and LCL, for their anticipatory merchandises. At present, Deppon's FBA service has spread over major developed countries including USA, Japan, UK, France, Germany, Italy and Spain. As its cooperation with Amazon deepens, the FBA service will reach more places in the world.

4.3.7.3 Third-Party Logistics in Coordinated Development with Multitude of Industries

3PL providers are active to engage in strategic partnership with downstream and upstream enterprises along the supply chain, and financial institutions such as banks; they keep optimizing the supply-chain structure, help increase profits for enterprises along the industrial chain, and realize co-development with multiple industries. For instance, to help a large beverage company in the US solve a number of problems confronting its sugar supply chain, such as price fluctuations and high stocking cost, HON Logistics proposed the solution of "supply-chain finance and logistics integration." The beverage company, HON Logistics, and the sugar company signed a tri-partite agreement. HON Logistics, via supply-chain finance, obtained special purchase fund from the bank, made payment to the sugar company on behalf of the beverage company, and managed its inventory and distribution. After receiving the goods, the beverage company settles payment with HON Logistics. Through the above model, the beverage company has considerably reduced its inventory and expenses incurred by distribution, thus improving its capital turnover rate. This practice demonstrates that, for bulk purchase and logistics management of raw materials in the food and beverage industry, the integrated solutions of HON Logistics have formed a synergetic action among the beverage producer, the raw materials supplier, the logistics enterprise and the bank, thus achieving a unique competitive advantage in the FMCG field.

4.3.8 *Third-Party Logistics Keeps Innovating Its Service Models and Industrial Forms*

Some 3PL providers are actively ushering in advanced technologies, pushing forward platform strategy, making in-depth online and offline fusion, building supply-chain integrated service platform, and developing innovative service models, thus giving rise to a number of emerging supply-chain management enterprises. These

enterprises form in-depth integration with downstream and upstream industries, thus merging materials flow, business flow, capital flow and information flow together to provide a unified supply-chain service, and begetting a prototype high-end logistics industry.

Transfar applies mobile information service and positioning technologies to create the “logistics + Internet + finance” format, and develops the intelligent highway logistics network operating system in China. Chang Yuan Logistics combines the offline highway hub port and the online cloud service platform in an extended manner. By constructing the “Internet + base + upstream-warehouse-downstream-shop + front-end-shop-rear-end-factory” model, it builds an eco-circle of intelligent industries. P.G. Logistics built a complex in Shantou of Guangdong Province called Baoao Town for the toy industry. Baoao Town integrates all toy-related services into one platform, encompassing idea-breeding, R&D, design, primary and auxiliary materials, machinery/equipment, product exhibition, exchanges, trading, experience, as well as warehousing, transport, distribution, inspection, Customs and financial settlement; by so doing, it created a huge supply-chain ecological circuit.

Shenzhen Eternal Asia Supply Chain Co., Ltd. is the first public supply-chain enterprise in China. The company has developed into a global integrated supply-chain service platform centered on production supply-chain service, consumption supply-chain service, global procurement center, product integration supply-chain service, and supply-chain financial service. This service network covers major cities in China and many countries in SE Asia, EU and the US. The service of Shenzhen Eternal Asia has successfully penetrated into sectors such as IT, telecom, medical service, petrochemicals, FMCG, household appliance, apparel, and security. It affords professional supply-chain services for more than 100 Fortune 500 companies and hundreds of renowned Chinese and foreign enterprises, such as CISCO, GE, INTEL, HP, TOSHIBA, HTC, P&G, Nestle, Unilever, Yihai Kerry, Johnson & Johnson, COFCO, Lenovo, and Tsinghua Tongfang.

Shenzhen SJET Supply Chain Inc. concentrates on forming new models of Integrated Industry-Finance Eco-circle. Via strategic alliance with world-famous software suppliers, it has established a large cross-border commerce comprehensive service platform based on its “SJET Supply-chain E-SCM B2B Platform.” It has become a comprehensive supply chain operator that integrates supply-chain management, export & import trade, procurement and sales of electronic equipment and apparatus, thus providing supply-chain management service for many famous Chinese and foreign enterprises in computers, mobile telecom, and medical device fields. Its clients include Lenovo, Huawei, ZTE, GIGABYTE, Synnex, CECT, Bank of China, and HSBC.

4.4 Existing Problems and Trend of Third-Party Logistics in China

Though 3PL has attained rapid growth in China in recent years, there still exist many problems, such as few world-renowned 3PL providers, low level of 3PL market concentration, inadequate unified supply-chain logistics services, and inexorable high logistics cost. In the future, as China continues to implement the *Medium and Long Term Development Plan of Logistics Industry 2014–2020* and a number of relevant policies, the level of its 3PL logistics integration will be elevated. In the meantime, emerging logistics business forms will blossom broadly and the pace of internalization of its 3PL providers will gather speed.

4.4.1 Existing Problems in Third-Party Logistics in China

4.4.1.1 Few World-Renowned Third-Party Logistics Providers and Low-Level of Market Concentration

Though a number of sizable 3PL providers have emerged in China that have great strength, yet comparing with developed nations, it has few 3PL providers that are well-known and influential in the world. According to the report by Armstrong & Associate, Inc.,⁵ China has only one enterprise on the list of the World Top 50 3PL Providers, whose operating revenue accounts for merely 2.8% of the grand total revenue of the Top 50 global 3PL enterprises. In contrast, eight enterprises from Germany, 20 enterprises from the US and nine enterprises from Japan are on the list, whose revenues take 32.5, 28.8 and 15.9% of the grand total.

Besides, third-party logistics in China are characterized by low-level of market concentration. CR1, an indicator of market concentration, measures the size of each 3PL Provider of the Top 50 3PL providers against its national 3PL market size. According to the 2015 data released by Armstrong & Associate, Inc., C. H. Robinson, the largest US 3PL provider, takes 0.91% of the 3PL market in the US. However, SINOTRANS, the largest Chinese 3PL provider, only takes 0.45% of the 3PL market in China. Most of the logistics service providers in 3PL market in China are SMEs, resulting in the low-level and serious homogeneity in logistics services. Consequently, most logistics enterprises find it difficult to build up their own brand advantage and core competitiveness.

⁵A&A's Top 50 Global Third-Party Logistics Providers (3PLs) List [EB/OL]. <http://www.3plogistics.com/3pl-market-info-resources/3pl-market-information/aas-top-50-global-third-party-logistics-providers-3pls-list/>. 2016-07-14.

4.4.1.2 Lack in Integrated Supply Chain Logistics Services

Judging from the service scope and the functions, most 3PL providers in China can only provide clients with fundamental logistics services such as trunk line transport and warehousing, yet lack value-added services such as processing and distribution, thus have difficulty to fulfill the holistic logistics service covering the entire supply chain which ranges from procurement of raw materials to sales of goods. As a result, there is a lacking of high-end logistics services and integrated supply-chain logistics services. According to the *Survey Report on Major Logistics Providers in China in 2016*, issued by the NDRC and China Federation of Logistics and Purchasing, in 2015, revenues from transport and warehousing accounted for 50% of total revenues made by the logistics providers in China, revenues from integrated logistics accounted for 13.3%, and those from processing accounted for 4.8%. Comparatively, 3PL enterprises in more advanced countries tend to adopt more outsourcing and provide various integrated services. For instance, according to the *US Third-party Logistics Report for 2016*, US consignors outsourced nearly 20 items of major logistics activities to 3PL providers; most often-seen outsourced activities are domestic transport (86%), warehousing (66%), international transport (60%), freight agency (44%) and Customs declaration (42%). In addition to the fundamental services, 3PL providers in the US are also dedicated to providing high-end integrated services such as supply-chain consultancy (19%), IT service (17%), fleet management (15%), service parts logistics (12%), and 4PL service (10%).⁶

4.4.1.3 High Logistics Cost Results in Low Margins

Impacted by a multitude of negative factors such as the small size of 3PL providers, segmentation of the logistics administrative institutions, backward infrastructures, and rising cost of logistics factors, 3PL providers in China are confronted with persistent high logistics cost. According to the *Survey Report on Major Logistics Providers in China in 2016* issued by the NDRC and China Federation of Logistics and Purchasing, during 2006–2015, logistics cost of major enterprises climbed at an annual rate of 11.5%. In particular, as price of logistics land use keeps rising in the cities, warehousing cost also keeps the momentum of rapid hike. On the other hand, due to few differentiated and value-added services, logistics enterprises (3PL enterprises included) are plagued with low profitability. For 2008–2015, while the average annual profit margin of major logistics providers stood at 7.6%, the average profit margin for them in 2015 had dipped to 6.1%. Conceivably, rising cost and depressed profit margin are adverse factors impinging on the sound development of the 3PL industry in China.

⁶C. John Langley, Capgemini. 2017 21st Annual Third-Party Logistics Study [EB/OL]. <http://www.3plstudy.com/>.

4.4.2 Third-Party Logistics Development Trend in China

4.4.2.1 Third-Party Logistics Will Bolster the Intensity Level

In the *Medium and Long Term Development Plan of Logistics Industry 2014–2020*, three focal points were raised and one of them is to “focus on improving the scale and the intensity of logistics providers.” The *Plan* stipulates clearly that it is necessary to (1) encourage logistics providers to grow stronger by ways of shareholding, M&A and alliance, so as to form a number of large modern logistics groups possessing advanced technologies, prominent core business, and strong core competitiveness; (2) push forward the air cargo couriers to conduct M&A, grow stronger and enhance the service capability of high-end logistics market; (3) encourage the railway, highway, civil aviation sectors, and enterprises to integrate resources, enhance cooperation and conduct integrated logistics operations. In addition, the *Action Plan of Cost Reduction and Efficiency Improvement in Logistics Industry for 2016–2018* issued by the NDRC also encourages the M&A among enterprises. In the future, as among industries and among logistics providers keep integrating their resources, the intensity level of 3PL will be elevated.

4.4.2.2 New Business Forms of Third-Party Logistics Will Evolve Quickly

As Internet, big data, cloud computing, AI and other emerging technologies become mature, 3PL providers will leverage these emerging technologies to accelerate their transformation and upgrading of business models. “Internet +” innovative models such as “Internet + vehicle/goods matching,” “Internet + cargo agency,” “Internet + drop and pull transport,” “Internet + contract logistics,” “logistics + Internet + finance,” and “logistics + Internet + big data” will be widely propagated. The highly-efficient intelligent integrated supply chain platform, the vehicle-free carrier, and other new business forms will be broadly populated.

4.4.2.3 The Pace of Internalization of Third-Party Logistics Will Be Accelerated

As the pace of international industrial transfer is sped up and the service trade expanding quickly, the logistics development model featuring global procurement, production and sales is being formed. It is urgent for China to foster some cross-border logistic providers that are deeply involved in international division of labor and have international competitiveness. At the same time, the implementation of the Belt and Road Initiative also affords great opportunities for the internationalization of 3PL providers. The Chinese Government will actively push forward cooperation and exchanges between domestic logistics providers and world leading logistic providers,

so as to support the logistics providers to go abroad. Presently, 3PL providers in China are speeding up their pace of internationalization. For instance, Kerry Logistics is actively involved in the first UK-China rail cargo project in the Belt and Road Initiative, developing the land transport network starting with China to reach Central Asia and Europe while covering the highway, railway and multimodal logistic services. With its global cargo network, Kerry Logistics provides end-to-end logistics solutions with great cost-effectiveness. As far as the trend goes, China's 3PL providers will play the leading role pertaining to logistics, enhance the layout of logistics resources in countries along the Belt and Road, actively follow the "going abroad" development strategy, so as to build the international logistics service network that matches the international trade needs and improves China's influence in international logistics.

4.5 Summary

This chapter mainly analyzes the environment, the current situation, the existing problems and the future trend of 3PL development in China.

As national economy maintains steady growth, China keeps expanding its demands for logistics. Industrial and commercial enterprises are outsourcing more of their logistics needs, creating huge demands for the 3PL market. At the same time, due to the upgrading and transformation of its economy and the rapidly reformed ways of its circulation, China has seen higher requirements for professional logistics services, as well as rapid growth of demands for livelihood logistics. The Government has actively instituted policies and measures which support and encourage the 3PL development, and fostered a positive policy environment.

As logistics demands rise quickly and as policy environment improves recently, the 3PL market size is growing steadily in China. 3PL providers are growing more diverse and stronger in their capabilities. The scope of logistics service has expanded and the 3PL providers are enhancing their capability in professional and customized services, as well as extending their service value chains. Meanwhile, many 3PL providers are engaging in coordinated development with relevant industries. They are also making innovations in service models and industry forms.

Though 3PL in China has attained considerable growth, there still exist many problems such as the small number of world-renowned 3PL providers, the low-level of concentration in 3PL industry, the lack of supply-chain integrated logistics services, and the high logistics cost. In the future, as the *Medium and Long Term Development Plan of Logistics Industry 2014–2020* and other relevant policies are fully implemented, the intensity of 3PL in China will be bolstered, the emerging business forms in logistics will be further developed, and the 3PL providers will be more readily internationalized.

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Chapter 5

Development of Highway Logistics in China



Ping Chen

As a flexible, convenient and widely-sprawled transport means, highway transport is an integral part of China's modern logistics system. Facilitating highway logistics is of vital importance for China in deepening its supply-side structural reforms, reducing the cost and improving the quality of its logistics industry, and forming a well-developed comprehensive transportation system. In recent years China has enhanced its policy environment of highway logistics market, improved its highway infrastructures, and made innovations in its service models. China is gradually establishing an efficient, safe, convenient modern highway logistics service system featuring high-quality service.

This chapter has four sections. Section 5.1 gives an overview of China's highway logistics, including the major characteristics, operating networks and operators of highway logistics. Section 5.2 describes the development environment for highway logistics, including the scale and structure of market demands, plans, policies, and relevant standards. Section 5.3 discusses the current development of highway logistics in China, including market size, infrastructure building, new models and business forms, level of service, fusion with other industries, and public information platforms. Section 5.4 points out the existing problems and future development trend of highway logistics in China.

5.1 Overview of Highway Logistics

Highway logistics refer to the diverse, comprehensive and integrated logistics service provided by highway transportation operators for manufacturers, commercial firms and others that need logistics services, via highway freight through highway networks.

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5.1.1 Main Characteristics of Highway Logistics

The characteristics of highway logistics are as follows.

First, highway logistics are quite flexible by nature. In addition to movements along the trunk transportation networks, highway logistics can also reach rural areas, enterprises, factories and warehouses to transport goods directly to the terminal destinations, thus realizing door-to-door service. Meanwhile, highway transportation can effectively connect with railway, waterway and air transport means, thus affording exceptional flexibility.

Second, highway logistics is characterized by rapid transport of small quantity of goods via single vehicle for short and medium-distance transportation. Compared with railway, air and waterway transportation, highway transportation carries smaller quantity of goods. Each array of boxcars by train can generally transport 3000–5000 tons of goods; one locomotive can pull a maximum load of more than 10,000 tons. One large-sized aircraft can transport more than 120 tons of goods. And the loading capacity of waterway transport can reach more than 1000 tons. In comparison, one truck can carry only 2.5–40 tons of goods. On the other hand, in short and medium-distance transport, highway transportation typically has few or even no transshipment, meaning that it can transport goods directly and precisely to the final designations at a high speed.

Third, highway logistics have easy market access. From the perspective of cost, highway logistics operators can gain access to the market by having certain number of trucks, loading/unloading facilities, and warehousing equipment. Furthermore, vehicle acquisition expense, operating cost and equipment maintenance cost are reasonable low, and the capital return period is relatively short. From the technical perspective, highway logistics operators require relatively simple skills for vehicle driving and repair work; driver training is also straightforward. From the perspective of business requirements, highway logistics operators only need to follow the national standards, without following the import and export and international conventions dictating the air transportation operators and marine logistics operators.

Fourth, highway logistics produces great amount of pollutions. At present, the heavy-load diesel trucks in highway transport emit large quantity of CO, hydrocarbon, oxy-nitride and particles, thus is deemed as one of the major sources of air pollution. Besides, compared with railway and waterway transportation carriers, the per unit energy consumption and discharge for highway vehicles are quite large, producing greater impact on air quality.

5.1.2 Operations Network of Highway Logistics

In general, the core nodes of highway logistics flow consist of terminal centers, transshipment centers and distribution centers. Highway logistics transports goods from place of origin to place of consumption, via less-than-truck-load, truck-load,

and express transportation, including operations such as goods transportation, storage, loading/unloading and delivery. See Fig. 5.1 for highway logistics operating network.

Highway logistics consists of three transportation types, namely, express transportation, truck-load transportation and less-than-truck-load transportation. In China, express transportation mainly provides e-commerce enterprises with trunk transportation and urban delivery service. Beginning from the distribution center in the place of origin, it passes through the transshipment center and transports the goods to the distribution center in the destination before delivering to the clients from the terminal nodes.

Truck-load transportation transports goods and sets the charge by unit truck. It mainly serves industrial manufacturers. By adopting the model of direct delivery with trucks, it provides door-to-door service, starting with the place of origin and transporting directly to the destination via highway routes. The major goods transported include bulk commodities such as coals and grains, and consumer goods such as home appliances, mechanical and electronic products.

Less-than-truck-load transportation transports goods, by combining orders each of which does not meet the truck-load volume/weight requirements, so each order is charged by the piece. Less-than-truck-load transportation includes two categories, namely, less-than-truck-load special route and less-than-truck-load express transportation. The former mainly serves commerce and trade wholesale enterprises, by collecting the less-than-truck-load goods in the city into one truck and transporting

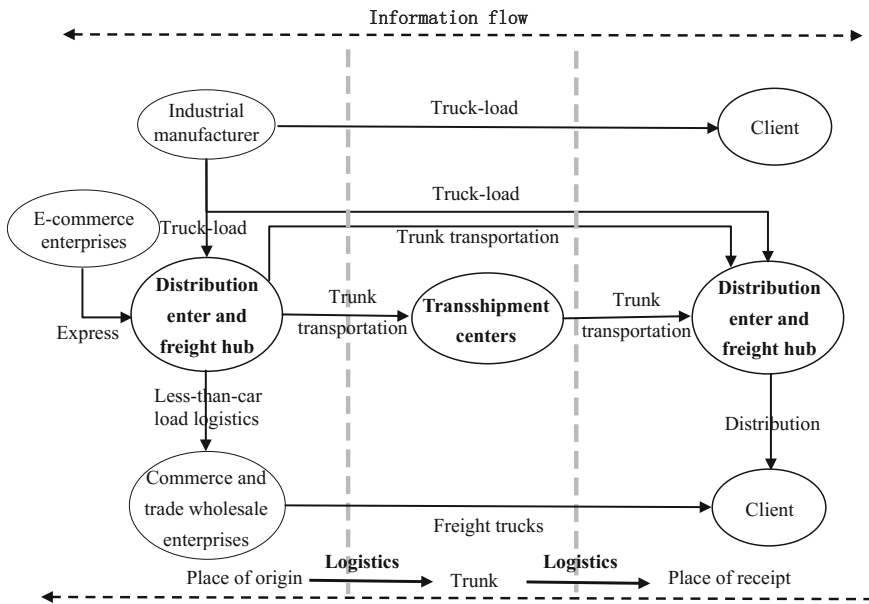


Fig. 5.1 Operating network of highway logistics

them directly in a “point-to-point” manner. Less-than-truck-load express transportation mainly serves industrial and commercial enterprises, gathering LTL goods into trucks and transporting them directly to clients in the form of regularly-scheduled freight trucks.

5.1.3 Major Operators of Highway Logistics

5.1.3.1 Transport-Type of Highway Logistics Operators

Transport-type of highway logistics operators are major players in highway logistics, which engage in goods transport, loading, unloading and haulage. They provide door-to-door, door-to-CFS (Container Freight Station), CFS-to-door and CFS-CFS transportation. Some transportation highway logistics operators can provide other logistics services such as packaging, distribution processing and Internet-based information services. Transport-type highway logistics operators in China can be categorized in the following manner.

In terms of ownership, transport-type highway logistics operators consists of the following four classes: (1) state-owned large professional transport operators such as Shandong Province Communication and Transportation Group; (2) private enterprises such as Arima World Group Company Limited and Deppon Express Stock Corporation; (3) foreign enterprises such as TNT Post Group N.V., TPG and Toll Global Express; and (4) self-employed private operators.

In terms of service characteristics, transport-type highway logistics operators can be divided into three classes. First, the less-than-truck-load transport operators which include less-than-truck-load special route and less-than-truck-load express transport operators. The former operators mainly serve industrial and commercial manufacturers and commerce/trade wholesale enterprises, adopting the point-to-point direct transport model, e.g., Annto Logistics Company Limited. The latter operators mainly serve industrial and commercial manufacturers or self-employed private enterprises that have small or fluctuating demands; they are capable of providing clients with services such as goods reception, transit, warehousing, transportation, loading/unloading, delivery, and accident handling, e.g., Deppon Express and Kakichi Logistics. Second, the truck-load transport operators mainly adopt the B2B model and provide truck-load transportation, sorting and packaging, and information tracking for large and medium-sized manufacturers with stable demands for transportation, e.g., Yuan Cheng Group Company Limited. Third, the express transport operators, which mainly transport parcels below 30 kg, e.g., S.F. Express Group Company Limited and Express Mail Service (EMS).

5.1.3.2 Warehousing-Type of Highway Logistics Operators

Warehousing-type of highway logistics operators mainly engage in highway warehousing service, providing clients with services such as goods storage, holding and transit. Warehousing-type of highway logistics operators generally provide two functions, namely, warehousing and collection/dispersion. Some operators can also provide delivery service, sales, distribution processing and other services. Warehousing-type highway logistics operators need to have warehousing facilities and equipment of certain size, own or rent necessary freight trucks. In addition, they can also provide Internet-based information services, and use the information system to query and monitor goods in the process of storage, holding and transit, e.g., China National Materials Storage And Transportation Corporation, and Shanghai Commercial Storage & Transportation Company Limited.

5.1.3.3 Platform-Type of Highway Logistics Operators

Platform-type of highway logistics operators refer to those operators that integrate highway logistics platforms in the background of “Internet + logistics.” By employing modern technologies such as Internet and cloud computing, they integrate online information platforms and offline logistics resources to build O2O platform network that links online and offline information, thus providing comprehensive logistics and supporting services for goods owners, logistics operators, self-employed truck drivers, and other parties involved in highway logistics. They mold the efficient goods dispatching platform to develop the all-new O2O ecology of highway logistics. At present, China’s platform-type of highway logistics operators consist of light-asset operators and heavy-asset operators. The former operators include oTMS and Chemanman Information Technology Company Limited; the latter operators include Transfar Zhilian Company Limited.

5.1.3.4 Freight Agent

Freight agents refer to the companies that work as agents of transportation operators to receive and transport goods and provide transport resources for the owner of goods. For the consignors, freight agents are carriers; for the transportation operators, freight agents are consignors. As a result, freight agents have dual-agency status. In the field of highway logistics, freight agents mainly provide services such as goods reception, document signing, sheet review, settlement, application for inspection, and multimodal transportation, thus linking truck owners, goods owners, goods inspectors, warehouses and transportation depots; exemplary agencies are SINOTRANS Guangxi Pingxiang Company and Citiway Group Company Limited.

5.2 Environment for China's Highway Logistic Development

At present, demands in logistics market, under China's New Normal Economy, are growing continually, and the structure of highway freight demands keeps upgrading. These facts have afforded a sound market environment for highway logistics development. The Government is keen on the development of highway logistics by issuing relevant laws, regulations and policies, and improving relevant standards to foster a favorable development environment for China's highway logistics. At the same time, China has also reduced the cost and upgraded the benefits of highway logistics while developing towards a more regulated and standardized orientation.

5.2.1 Market Demands Continued to Rise

In 2011–2016, China continued to increase its industrial added value in a steady manner, with an average annual growth rate at 6.24%. In 2016, China's industrial added value stood at 24.8 trillion RMB, growing by 6.0% year-on-year (YOY). See more details in Fig. 5.2. Of the gross domestic product, the primary industrial added value was 6.4 trillion RMB, rising by 3.3% YOY; the secondary industrial added value was 29.6 trillion RMB, rising by 6.1%; the tertiary industrial added value reached 38.4 trillion RMB, growing by 7.8% YOY. In 2016, of the above-scale industries,¹ the computer, telecom and other electronic equipment manufacturing industries grew by 10.0%; the emerging strategic industries grew by 10.5%; the high-tech manufacturing industries grew by 10.8%. Along with these high growths are transformation and upgrading of various industries. Added value of agricultural and food processing industry increased by 6.1% from the previous year, that of manufacturing industry grew by 6.8%, that of chemical raw materials and chemicals manufacturing industry rose by 7.7%, and automobile manufacturing industry increased by 15.5%. These growths have stimulated the demands for transportation of commodities.

During the 12th Five-year Plan period, total retail sales of consumer goods in China kept a stable growth with an average annual growth rate at 15.9%. In 2016, total retail sales of consumer goods reached 33.2 trillion RMB, rising by 10.4% YOY. See Fig. 5.3 for details.

As its citizens keep upgrading their consumption structure, China has seen evident escalation in the categories of goods featuring small quantity, many batches, high added value, and light weight. In particular, the rapidly-growing e-commerce has led to a field with fastest-growing market demands. In 2011–2016, trade value in e-commerce market in China kept booming with an average annual growth rate of 29.5%. In 2016, China's e-commerce market trade volume reached 22.0 trillion RMB, rising by 20.2% YOY. See Fig. 5.4 for details. At present, highway transportation is

¹Above-scale industries include wholly-state-owned industrial enterprises and non-state-owned industrial enterprises whose annual revenue of main business reaching five million RMB and above.

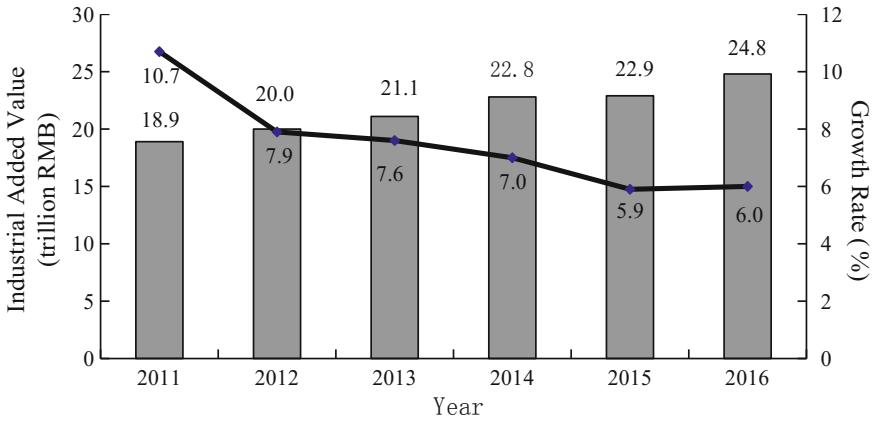


Fig. 5.2 Total industrial added value and growth rate for 2011–2016. *Source* Compiled from the China Statistical Bulletin of National Economy and Social Development (2011–2016), published by the National Bureau of Statistics of China

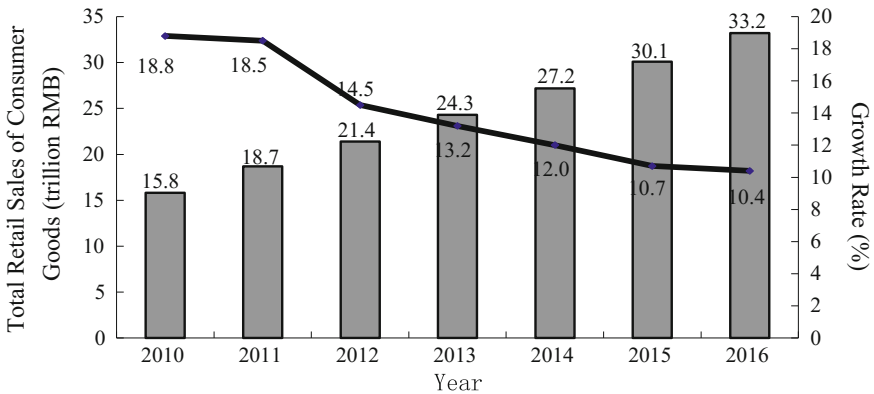


Fig. 5.3 Total retail sales of consumer goods and growth rate for 2010–2016. *Source* Compiled from the China Statistical Yearbook (2011–2015) and the China Statistical Bulletin of National Economy and Social Development (2016), published by the National Bureau of Statistics of China

the major means of transporting express parcels and mails, accounting for over 90% of express transportation (State Post Bureau 2017).

5.2.2 Structure of Highway Freight Demands Kept Upgrading

As China kept upgrading its industrial structure and consumption structure, both the volume and structure of highway logistics are experiencing profound changes.

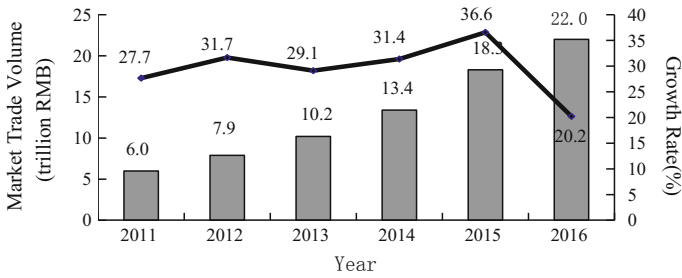


Fig. 5.4 E-commerce market trade volume and growth rate for 2011–2016. *Source* Compiled from the E-commerce Data Report for 2011–2016, by China E-commerce Research Center

In terms of production means, China is in the development phase of being driven by domestic and overseas demands, industrial upgrading and gradient transferring of industries from the Eastern Region to the Western Region. While the growth rate of demands for coal, petroleum and steel slowed down, the highway freight industry showed signs of sluggish growth. In terms of lifestyle, as China's citizens kept improving their living standards, the Central and Western Regions and rural areas also released their consumption potential. For this reason, demands for freight transportation saw increase between the inland areas and the coastal/border regions, and between urban and rural areas, resulting in new demands for highway logistics in China.

Demands for cold-chain logistics and other professional logistics were increasing rapidly. Stimulated by the consumption market and industrial manufacturing, cold-chain logistics, hazardous chemicals logistics, clothing logistics, FMCG logistics and other professional logistics have ample room of development, triggering more and more demands for professional logistics. Take cold-chain logistics as an example, China has a huge and fast-growing market demands for cold-chain logistics. In 2015, the cold-chain market size reached 158.3 billion RMB and is expected to amount to 347.9 billion RMB in 2020 (SOHU 2016). At present, highway is the major means of transporting cold-chain commodities in China. The continuous growth of market demands for cold-chain logistics has brought more demands for professional transportation to highway logistics in China, thus becoming the new growth points.

Demands for time-sensitive freight transportation were rising. As e-commerce develops rapidly, express delivery is expectedly seeing fast growth. Highway transport is still the major means of transportation for express delivery industry. It is expected that in the next 3–5 years, demands for express highway transportation will continue the rapid growth. Express transportation has higher requirements for timeliness. The transportation demands such as same-day delivery, second-day delivery and designated-time delivery of large parcels raise higher requirements for highway logistics.

5.2.3 Relevant Highway Logistics Policies and Measures Were Issued

In recent years, the State Council of China, the Ministry of Transport of China and other administrative offices have issued a number of policies, plans and guidelines which detailed policies regarding highway logistics. The administrations have issued relevant policies and rules on “replacing business tax with value-added-tax (VAT),” the Non-truck Operating Common Carrier (NTOCC), establishing logistics information platforms, stemming over-loaded or oversized trucks on the road, reducing cost and boosting profit in highway logistics, and building of logistics channels, so as to push forward the sound development of highway logistics.

In June 2013, the Ministry of Transport of China issued the *Guidelines on Transportation in Pushing Forward Healthy Development of Logistics Industry*, which stipulated that China should accelerate issuing guidelines on “construction of highway network and highway logistics nodes,” “developing drop-and-pull transportation,” “building of public information platform for transportation logistics,” and “promoting logistics development in key fields.” In July 2015, the State Council of China released the *Guidelines about Pushing Forward “Internet +” Campaign*, which proposed 11 major actions such as “Internet + efficient logistics,” so as to promptly build up the cross-sector and trans-region logistics information service platform, and improve the linking of logistics demand and supply information, and the efficiency in utilizing such information. In June 2016, the NDRC issued the *Plan of Building Sound Market Environment and Integrating Transformation with Logistics*, which dictated relevant offices to achieve notable outcomes in blending transportation with logistics and secure well-organized promotion of highway ports and intelligent distribution model by 2018. In June 2016, the Ministry of Transport of China issued the *Plan of Building Freight Hubs (Logistics Parks) in the 13th Five-year Plan Period*, which clarified the goals of building logistics parks, the major construction plans and the current status of project bank in the 13th Five-year Plan Period. In August 2016, the Ministry of Transport, the Ministry of Industry and Information Technology, the Ministry of Public Security and the General Administration of Quality Supervision, Inspection and Quarantine, and the State Administration for Industry & Commerce of China jointly released the *Opinion on Stemming the Illegal Truck Refitting, Overloading and Over-sizing*, and the *Plan of Managing Truck Transportation*, which stipulated the outline dimensions, axle load and quality perimeters of trucks, trailers and combination vehicles. In September 2016, the Ministry of Transport released the *Opinion of the General Office of the Ministry of Transport on Pushing Forward Reform Pilot Test and Speeding up Innovative Development of Non-truck Carrier Logistics*, which raised clear-cut requirements for the organizing capability of freight sources and vehicles of non-truck operating carriers, the IT-based management of vehicle operations, the compensations and the responsibility in transport risk.

5.2.4 Highway Logistics Standards Kept Improving

To further regulate the development environment of highway logistics, and promote the building of highway logistics standards, relevant government departments and industries are actively instituting highway logistics standards, so as to steer China's highway logistics toward an efficient and healthy development.

In July 2008, the General Administration of Quality Supervision, Inspection and Quarantine of P.R.C. and the Standardization Administration of P.R.C. jointly released the *General Technical Conditions for Transportation and Packaging of Common Goods* (GB/T 9174-2008). The standard specifies the general requirements, types, technical requirements and performance test of transportation and packaging of common goods; these requirements are applicable to common goods, excluding hazardous goods, or fresh and perishable goods.

In March 2011, the Ministry of Transport of P.R.C. started to implement the national standard specified by the *Technical Conditions of Highway Drop-and-pull Trucks* (JT/T 789-2010). The standard regulates the performance and equipment specifications of semi-trailer tractors, semi-trailers and freight trains hauling total weight under 49 tons, thus providing basic standard conditions for the development of drop-and-pull transportation in China.

In July 2016, the General Administration of Quality Supervision, Inspection and Quarantine and the Standardization Administration instituted the national standard entitled *Limits of Outline Dimensions, Axle and Quality of Trucks, Trailers and Combination Vehicles* (GB 1589-2016), which set the new standard of specifications, emissions and loading limit of trucks to promote the regulated development of highway logistics.

5.3 Current Development of Highway Logistics in China

As market environment and policy environment keep improving in China, the highway logistics industry has maintained a positive development trend. Since highway freight volume keeps increasing, and the infrastructures continue improving, a highway transport network meeting the requirements for integrated transportation system has basically been established. Meanwhile, new models and business forms for highway logistics are emerging, the professional level and intelligent level are being enhanced, the public information platforms are being built rapidly, and coordinated development with other industries such as manufacturing, trade, commerce and modern agriculture are being fortified.

5.3.1 Size of Highway Logistics Kept Growing

In 2011–2015, highway freight volume in China had an average annual growth rate of 10%, but the growth rate showed an overall declining trend. See Fig. 5.5 for more details. In 2016, highway freight volume in China reached 33.41 billion tons, rising by 6.1% YOY. The freight turnover volume stood at 6.11 trillion tons/km, rising by 5.4% YOY. See more details in Fig. 5.6.

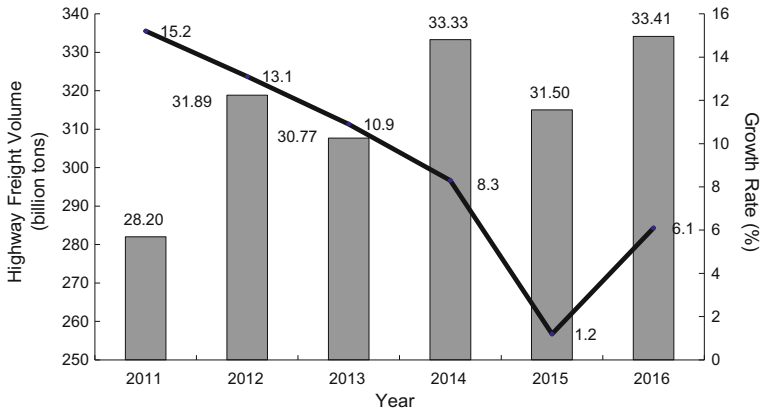


Fig. 5.5 Highway freight volume and growth rate for 2011–2016. *Source* Compiled based on the Statistical Bulletin of Transportation Industry Development of the People’s Republic of China (2011–2016), published by the Ministry of Transport of China. *Note* In accordance with the special economic survey on transportation industry in 2013, the statistical scope of waterway and highway transportation volume was adjusted

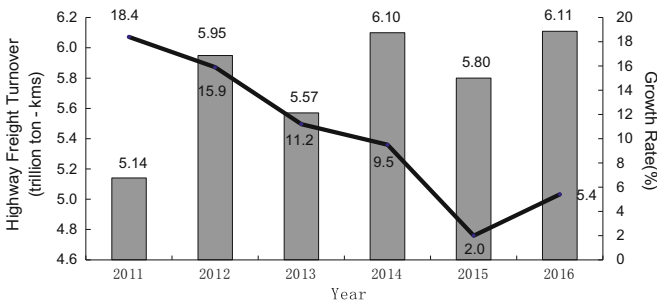


Fig. 5.6 Highway freight turnover and growth rate for 2011-2016. *Source:* Compiled based on the Statistical Bulletin of Transportation Industry Development of the People’s Republic of China (2011-2016), published by the Ministry of Transport of China. *Note:* In accordance with the special economic survey on transportation industry in 2013, the statistical scope of waterway and highway transportation volume was adjusted

5.3.2 Highway Logistics Infrastructures Kept Improving

In recent years, China continues to augment the investment in transportation, optimize and improve the structure of highway networks, and build a number of highway freight hubs offering comprehensive logistics services. Through these endeavors, China has preliminarily established the highway transportation network featuring multiple nodes, networked linkages, and a broad coverage. These characteristics are described below.

First, highway network keeps expanding its size and density and optimizing the network structure. By the end of 2016, total mileage of highways in China reached 4696 thousand km, rising by 2.6% YOY. The mileage of Grade-IV and above highways reached 4226.5 thousand km, accounting for 90% of total highway mileage. The structure of highway network had thus been optimized.

Second, construction of highway freight hubs has been enhanced to basically establish a development pattern which adapts to local economic and logistics development. In the 12th Five-year Plan Period, China invested in building 115 logistics parks and highway freight hubs, offering comprehensive logistics services in 119 cities of 28 provinces and municipalities. It also encouraged the traditional freight depots to upgrade into logistics parks and to connect with ports, railways and other transportation means, thus greatly improving the public service capability and development level of highway freight hubs.

Third, trucks employed in highway logistics have grown larger in capacity and more specialized. In 2016, China had 13,517,700 trucks, decreasing by 2.7% in number YOY; freight volume was 108,267,800 tons, rising by 4.4% YOY. Of these trucks, there were 9,460,300 ordinary trucks, down by 6.5% YOY, which carried freight volume at 48,438,300 tons, down by 2.8% YOY; there were 475,600 special trucks, down by 1.7% YOY, which carried 5,276,300 tons of freight volume, rising by 4.9% YOY. Among the trucks, refrigerated trucks, thermal trucks and vegetable-carrying trucks all showed a trend of specialization. According to the data of the Ministry of Public Security about licensing of motored vehicles, in 2015, China sold 17,452 refrigerated trucks, rising by 9.65% YOY.

5.3.3 New Highway Logistics Models and Business Forms Developed Vigorously

As “Internet + logistics” based on big data, mobile Internet technologies moves forward, and as logistics is deeply integrated with transportation, new models and business forms of highway logistics develop vigorously, thus promoting the reforms in highway logistics industry in China. Specific advancements are as follows.

First, China has begun to push forward the NTOCC pilot test. From October 2016 to December 2017, the Ministry of Transport conducted NTOCC on highway freight nationwide. NTOCC platforms have emerged gradually, including Hletong, Cainiao

Network and Kaxingtianxia, which share the information system, settlement system and service standard on the logistics platforms, thus integrating the logistics resources and realizing the data pooling, information interaction and third-party supervision of trucks.

Second, the new model of “Internet + highway logistics” was rapidly developed. To solve the difficulty in matching trucks and goods caused by information asymmetry, the intermediary service platforms use Internet technologies to provide goods owners and truck owners with matching service; examples are Huochebang, Loji, and Yunmanman. Some logistics technical service platforms mainly provide goods owners and transportation operators with transportation management, warehousing management and capacity tracking service.

Third, highway drop-and-pull transportation in China continued to move forward. In the 12th Five-year Plan Period, the Ministry of Transport implemented 209 pilot projects of drop-and-pull transportation, which stimulated 27.86 billion RMB of private investments, and saving 210,000 tons of fuel and nearly 30 billion RMB of logistics cost (Xinhua News Agency 2015). Nine provinces, including Shandong, Jiangsu and Zhejiang, have conducted drop-and-pull transportation pilot test in their respective territories. According to statistics of the Ministry of Transport, enterprises engaged in the drop-and-pull pilot test saved an average transportation cost of 10–20%, compared with that operating under the traditional transportation model. The average daily driving mileage of trucks reached 380 km with average mileage usage rate of more than 80%, both numbers are much higher than the average levels of the industry and approaching the levels attained in developed countries. The average freight turnover completed by one truck reached 3.51 million tons/km, or 2.5 times more than the average level for the industry (Xinhua net 2015).

Fourth, the highway port model was promoted. Highway port is the model of logistics service platform first developed by Transfar Logistics. By connecting online logistics platform and offline highway port networks, China developed the all-new O2O highway ecology. In 2013, the NDRC, with four other Ministries and Commissions, jointly released an edict, requiring local governments to promote Transfar’s experience in highway port logistics. Shenyang constructs the highway port close to the railway port in an effort to build the national multimodal center; Quanzhou Transfar highway port pushes forward the connectivity among port cities along the “Maritime Silk Road,” building Quanzhou into the intelligent starting point of the 21st Century Maritime Silk Road. Tianjin builds many Transfar highway ports featuring connectivity and multimodal transportation, consisting of maritime, land and aviation transportation; presently these ports have accommodated over 500 businesses.

5.3.4 Highway Logistics Service Level Kept Improving

In recent years, as highway logistics enterprises are integrated and allied, timeliness of transportation keeps improving, and categories of express delivery products are increasing; China has markedly improved the service level of its highway logistics.

For example, in 2014, China Alliance of Highway Special Routes was established. Through the Alliance, small and medium-sized enterprises operating on special routes have expanded their business, increased the revenue, integrated the resources, reduced the cost and built up their brands. In January, Huazhongdadao Express Alliance was established in Wuhan. In March, Prosperous Logistics was established by nine special-route enterprises in Henan. In August, Heilongjiang Lanmeng Logistics Co., Ltd. was established. In November, Tianjin Wanzhong Logistics Alliance was founded.

In addition to meeting customers' higher requirements for timeliness, Deppon Logistics keeps improving its corporate strategy, optimizing its timeliness management system, fortifying its differentiated timeliness management strategy emphasizing service priority, and improving its transshipment network. Deppon Logistics has successively launched the Scheduled Truck Service, the Inter-city Express Truck Service, and the Punctual Truck Transport Service. It takes advantage of the expressway network and the express truck transportation to ensure delivery timeliness, thus meeting regional clients' needs for on-time delivery.

Furthermore, as customers' needs become more diverse, various categories of express delivery products are innovated. S.F. Express Group Company Limited has launched the cold-chain delivery service, providing high-quality and time-sensitive service to customers with demand for fresh-goods delivery. Cainiao Logistics has launched the service allowing customers to designate the time of parcel delivery. EMS and Deppon Logistics have also launched the same-day delivery, second-day delivery, and designated-time delivery of large parcels, to meet the diverse customer demands.

5.3.5 Highway Logistics Accelerated Coordinated Development with Other Industries

In recent years, highway logistics has accelerated integration with other industries, engaged in synergetic development with them, made innovations in industrial models, leveraged the flexible and professional features of highway logistics, entered into strategic partnership with downstream and upstream enterprises, filled the shortfalls of collaborating industries, and helped develop manufacturing industry, trade, commerce and modern agriculture in China. Features of this development are discussed as follows.

First, highway logistics has gotten into synergetic development with the manufacturing industry. For example, Shanghai Anji Tonghui Automotive Logistics Co.,

Ltd. took full advantages of its supply chain resources to provide four major services for Shanghai GM, including circular picking, delivery center, distribution center, and export packaging. Services in Delivery Center include all inbound logistics activities such as requisition for China-made/imported parts and components, materials receipt, storage, unpacking, re-packing, pulling, and scheduling. In 2017, Transfar Logistics signed a strategic partnership agreement with FAW Jiefang Automotive Company Limited and Ji'nan Truck Co., Ltd.; both parties would abide by the mutual benefit and the win-win principles to establish the strategic alliance, and cooperate in the areas of automobile sales, marketing, after-sales service, and intelligent system, thus pushing forward both parties' development in logistics industry.

Second, the highway logistics industry has engaged in synergetic development with trade and commerce. For instance, highway logistics enterprises, Tiandi Huayu, Deppon Logistics, and CNEX, while maintaining their traditional less-than-truck-load service, also expanded business in scheduled express delivery service. Tiandi Huayu has partnered with Taobao and Alibaba to enter the online shopping field in the capacity of major third-party logistics operator. In July 2012, Tiandi Huayu announced partnership with Tencent to become its first highway express service provider, providing Tencent's QQ Express and other e-commerce businesses with highway express service focusing on Day-Definite Delivery.

Third, the highway logistics industry has entered into synergetic development with modern agriculture industry. In February 2015, Hebei Ruigufeng Logistics Group Company Limited and Beijing Capital Agribusiness Group signed an agreement to co-invest 26 billion RMB in Beijing-Tianjin-Hebei region and build ten modern logistics parks for agricultural products. The move affords a complementary support between downstream and upstream entities along the industrial chain, to build a modern and safe food production, circulation and operational system, featuring rational spatial layout and complete industrial chain. The collaboration considerably enhances the degree of standardization, specialization, IT development, branding and cold-chain development of agricultural production and circulation in the Beijing-Tianjin-Hebei region. In 2016, the S.F. Express Group Company Limited signed the framework agreement of strategic cooperation with China CO-OP E-commerce to jointly push forward e-commerce development of agriculture. The S.F. Express Group will work together with China Supply and Marketing Electronic Commerce Co., Ltd. to build a seamless connection of logistics systems among cooperatives at the county, township and village levels. The purpose is to break the logistics barriers for rural residents so that they can enjoy the same-day delivery service and the second-day delivery service as the urban residents do, thus realizing efficient distribution of e-commerce to rural areas.

5.3.6 China Sped up Building Highway Logistics Public Information Platforms

In recent years, Chinese governments at all levels have sped up building logistics public information platforms. These logistics information platforms play an indispensable role in integrating logistics resources, promoting information connectivity, and improving the level of logistics organizations, thus encouraging highway logistics enterprises in China to link up with other enterprises while enhancing the synergy among them.

In February 2010, Hunan started to build its Logistics Public Information Platform. The Platform links together the provincial government, the logistics associations, the well-known logistics enterprises, the insurance companies, the commercial banks and the e-commerce firms. Starting with e-commerce, the Platform draws the enterprises on the downstream and upstream along the industrial chain to work together and provides professional logistics services including logistics finance, information issuance and query, trading, and consultancy on logistics planning.

In March 2011, Beijing Logistics Public Information Platform was put into operation. This Platform includes seven application service centers, provides online parking information for logistics operators' vehicle management system, and provides logistics operators with data swapping system for exchange of sheet data. Besides, the Platform also includes a public service center, which mainly provides private users with public services such as information on official certification of logistics enterprises, logistics insurance, financing and loan, and traffic conditions.

In April 2011, Shandong Transportation Logistics Public Information Platform was put into operation. To alleviate the problems such as difficulty in exchanging corporate information, poor reputation of the logistics industry, high information cost for enterprises, and disparity of demand-supply information among enterprises, the Platform provides highway logistics enterprises and truck owners in the province with data exchange services. To some degree, it helps integrate the resources of the logistics market, regulate the order of the logistics market, and improve the operations level of the logistics industry.

In September 2012, the Ministry of Transport kicked off the building of National Transportation & Logistics Public Information Platform to guide the provinces and municipalities and the enterprises to build their own logistics information platforms, to facilitate the effective connection of various government/public service information with market logistics information, and to satisfy the demands for logistics data exchange among enterprises, between government and enterprises, among industries, and among countries.

In January 2013, Sichuan Logistics Public Information Platform was put online. The Platform integrated latest technologies of cloud computing, IoT and the "three-net-in-one" function, and worked as a comprehensive application platform geared on the supply chain. The Platform, supported by fundamental telecommunication, provides applied management system, financing guarantee and other services.

5.4 Problems and Trends of Highway Logistics in China

Though in recent years China has maintained a steady development in highway logistics, there still exist conspicuous problems such as relatively singular functions of its infrastructures, low degree of intensive and organized development, and to-be-improved market environment. As China keeps on improving its logistics environment, the highway logistics industry will further deepen the reform. Highway logistics is expected to make progress toward a more professional, platform-led, green and intelligent development.

5.4.1 Problems in China's Highway Logistics

5.4.1.1 Highway Logistics Infrastructures Have Singular Functions

As the major infrastructures in highway logistics, China's highway freight depots are still plagued with problems such as irrational layout, poorly-developed functions and loose management. There are only a small number of large-sized comprehensive freight depots; the proportion of small freight depots and loading/unloading stations is rather high. Besides, most of the freight depots are operating by the model of traditional freight hubs; their service function is relatively singular, the technology and equipment are backward, thus they are incapable of providing comprehensive functions and services such as warehousing, storage and information distribution.

5.4.1.2 Highway Logistics Have Low Level of Intensive and Organized Development

Highway logistics in China have low level of intensive development, and are small, sparse, chaotic and inadequate. At present, highway freight market in China is dominated by small and medium-sized freight enterprises and self-employed transportation operators. The market shares of highway transportation are extremely dispersed. The majority of highway transportation is undertaken by small and micro-sized logistics operators. For instance, the Top 5 highway logistics enterprises in China including Deppon Logistics and CNEX only account for 2% of the highway freight volume, while 98% of the freight is carried by the dispersed 12 million trucks and 30 million truck drivers (Gao 2014). Overall, there is a lack of large transportation enterprises to steer the highway logistics and transportation market.

Besides, most highway logistics enterprises have inadequate capability in information management, thus are incapable of forming business alliance. Furthermore, the highway transportation industry as a whole has relatively lower entry threshold, resulting in enormous number of self-employed operators and private trucks operat-

ing in the market. Some freight depots are poorly organized, lacking proper division of labor and coordination.

5.4.1.3 Market Environment yet to Be Improved

At present, China has not established a well-developed credit system for highway logistics enterprises and drivers; lacking of proper service mentality and credibility mechanism contribute to the high rate of lost goods during highway transport. Besides, there are still blatant problems of improper or boorish law enforcement at the operational level, such as unauthorized fee collection or arbitrary fines on highways. On the administrative side, there still exists the phenomenon of “strict on approval, loose on supervision.” It is apparent that well-developed market credibility system and operational monitoring system for highway logistics are yet to be established.

5.4.2 Future Trend of China’s Highway Logistic Development

5.4.2.1 Highway Logistics Will Move Towards Intensive and Efficient Development

In the 13th Five-year Plan period, China will direct the transformation and upgrading of freight transportation, push forward the scope and scale of transformation implementation, and promote the intensive and efficient development of highway logistics. To be specific, China will foster and regulate the development of light-asset platform-driven logistics enterprises, and guide them to transform towards the NTOCC and freight agents business models; it will also help the small, medium and micro-sized freight firms to form alliances. Besides, China will advocate the implementation of highway drop-and-pull transportation, promote the standardized semi-trailer vans, and improve the standardized depot facilities for drop-and-pull transportation. Advancing accordingly, China will build the highway freight transportation system featuring efficient organization, advanced equipment, convenient transport, and green development.

5.4.2.2 Mobile Internet Will Boost Development of New Business Forms in Highway Logistics

Mobile Internet is profoundly changing the production means and the lifestyle in China. It is expected that by 2020, mobile Internet will be fully popularized in China. By then, the highway logistics industry will be more open, demands of the populace more diverse, and the information resources more abundant; thus the prospect for

highway logistics to attain innovative integrated development with mobile Internet technologies is promising. As mobile Internet, big data, cloud computing, IoT and other technologies are extensively used in highway logistics, models of traditional freight service will be reformed and upgraded rapidly; various new business forms and new models will emerge, and the O2O business model will be vigorously developed. Regulated and guided by the nation's policies, the emerging business forms will embrace orderly development to realize a high-degree of resource sharing, a more efficient organization and personalized service, thus becoming the new area of economic growth for highway logistics.

5.4.2.3 Highway Logistics Will Continue to Raise the Level of Greenness

The 13th Five-year Plan of Comprehensive Transportation Service dictates that by 2020 green transportation system in China will be better-developed with notable effect of intensive resource usage and wider application of clean energies, new-energy vehicles and various new energy-efficient technologies, equipment and products. The number of new-energy vehicles will reach 300,000 units including those used in urban public transport, taxi-cab and urban logistics delivery. The ratio of operating tractor trucks to trailers will not be lower than 1:2. Volumes of fuel consumption and CO₂ emission of operating trucks will be reduced by 2.6 and 8%, respectively. Green development of highway logistics will be greatly accentuated and a higher level of greenness will be attained.

5.4.2.4 Highway Logistics Will Move Towards Intelligent Development

In the 13th Five-year Plan Period, highway logistics in China will move faster towards intelligent development. Highway logistics will deeply integrate with new-generation information technologies, lifting the rate of network access and the rate of online operations of major operating vehicle network system to 99 and 95%, respectively. The electronic waybills will be promoted to realize whole-process monitoring of the status of goods and real-time review of the entire process. The freight APP will be promoted in an orderly way to facilitate supply-demand information access and efficient integration of resources. The Internet of Vehicles, intelligent tracking, and other information technologies will be extensively used in highway logistics with broader development of trans-medium, trans-regional and trans-sector connectivity and information sharing, thus breaking the phenomenon of "isolated information island."

5.5 Summary

This chapter introduces the development of highway logistics in China from four perspectives, namely, an overview, the development environment, the current development status, and the existing problems and future trends of highway logistics. In terms of development environment, demands in logistics market in China continued to grow, the structure of highway freight demands kept upgrading, the time-sensitive and personalized high-quality highway logistics demands kept increasing. At the same time, China has issued many policies and measures regarding highway logistics, improved the service regulations and standards of highway logistics, and bettered the development environment of highway logistics.

As for the current status of development, the scale of highway logistics in China continued to expand, and the highway logistics infrastructures kept improving. At the same time, new models and business forms of highway logistics continued to develop vigorously while the service level in highway logistics kept enhancing. Besides, the highway logistics industry sped up its coordinated development with other industries, and highway logistics public information platforms were broadly established.

Concerning the existing problems and future development trends, highway logistics in China are still confronted with problems such as singular function of its infrastructures, low degree of intensive and organized development, and ineffective market environment. As future development environment being improved, highway logistics will become more intensified and efficient. At the same time, mobile Internet will foster the development of new business forms in highway logistics. Furthermore, green and intelligent development in highway logistics will be accentuated and boosted.

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Chapter 6

Development of Express Logistics in China



Zhi-Lun Jiao

As Internet economy and e-commerce develop, China's demands for express logistics rise briskly; with the continually improving environment of industrial development, the express logistics industry has made steady progress in terms of business volume, service innovations and synergetic development. As relevant technologies and management level continue to elevate, express logistics in China is accelerating the pace in industrial transformation, market integration, and service upgrading.

This chapter includes four sections. Section 6.1 introduces the service providers, service products, operating network, operating process, major characteristics and operating models of China's express logistics. Section 6.2 discusses the development environment of express logistics in China, including certain specific environment of market demands, policy environment and technical environment. Section 6.3 analyzes the current development of China's express logistics, including business scale, professional service, synergetic development with the e-commerce industry, and market integration. Section 6.4 addresses the existing problems and future trend of express logistics in China.

6.1 Overview of Express Logistics

According to the definition of the *Postal Law of the People's Republic of China*, express delivery refers to delivery activity which is accomplished promptly within promised time frame. Express delivery is relatively independent in national logistics system, having specialized warehousing, sorting and delivery process, and independent facilities, equipment, delivery channel, and personnel. As the industry moves forward, new-types of express delivery enterprises and innovative delivery models keep emerging. Innovative service models such as express delivery platform, meal delivery service, shopping errands, intelligent express box are extending the service

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chain of express delivery enterprises while expanding the connotations of express delivery service.

6.1.1 Service Providers and Service Products of Express Logistics

Service providers in express logistics are in general express delivery enterprises. In China, express delivery enterprises must by laws obtain business license for express delivery service. At present, China has several well-known express delivery enterprises, including EMS, SF Express, ZTO Express, YTO Express, STO Express, Best Express, Yunda Express, and ZJS Express. Major foreign express delivery enterprises operating in China include UPS and FedEx from the US, DHL from Germany, and Black Cat of Yamato from Japan. In China, express logistics mainly serves end consumers, delivering letters and documents posted by individual clients and parcels derived from online shopping. Besides, express logistics also makes deliveries among enterprises, consisting of samples, certificates, business letters, contracts, certain parts and components, and finished products. The huge demand for parcels derived from online shopping has stimulated an explosive demand for express parcel delivery. For instance, the four enterprises in China's express delivery industry ("STO, YTO, ZTO and YUNDA") are all predominantly parcel delivery servers for e-commerce online shopping.¹

6.1.2 Operating Network and Procedure in Express Logistics

The general operating procedure in express delivery, centered on the tri-level distribution network consisting of regional central warehouses, urban sub-warehouses and express delivery outlets, realizes door-to-door time-definite service. Figure 6.1 depicts the operating network of express logistics. Express logistics originates from the gathering of outgoing shipment orders. For individual shipment orders, couriers from express delivery outlets go to the domiciles of the residents or enterprises to pick up their letters, documents or small parcels. For orders from large and medium-sized e-commerce companies with independent warehouse facilities, the local urban

¹"STO," "YTO," "ZTO," and "YUNDA" refer to the four major express logistics operators in China (in Chinese, the names of these four companies can be abbreviated as "3 Tong and 1 Da," for the first three names have the word "Tong," and the fourth name has the word "Da."). Tong Da, in Chinese language, means smooth transportation and well-developed logistics system. They are emerging express delivery enterprises that expand as online retails boom in China. During the time Taobao, Tmall and other online shopping platforms grow vigorously, the "3 Tong and 1 Da" enterprises have built the franchised express delivery networks that cover most cities in China in a short period. After securing rapid expansion, the four enterprises are now public companies (see the following chapters).

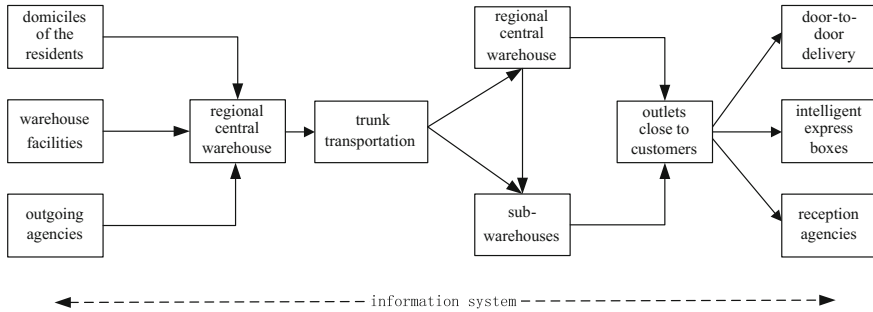


Fig. 6.1 Schema of operating network of express logistics

sub-warehouse or large outlets send large vehicles to pick up the shipments in warehouses once or several times a day. Outgoing shipments are collected and processed at the regional central warehouse; it sorts out and repackages the goods according to the specifications of the orders, then moves the orders to the outgoing areas of the designated destinations. The trunk transportation sends out the orders to the designated receiving points (regional warehouses or sub-warehouses) via aviation, railway or highway, as appropriate. Some cross-country express parcels also need to be transferred to the Customs and complete the Customs clearance procedure for exporting/importing. Incoming orders at the receiving destinations are sent to the outlets close to the receiving customers, and then delivered to them in the form of door-to-door express delivery, self pick-up at the intelligent express boxes, or self pick-up at the reception agencies.

6.1.3 Major Characteristics and Operating Models of Express Logistics

6.1.3.1 Major Characteristics of Express Logistics

Express logistics have the following five characteristics. (1) Express logistics has tighter requirements on timeliness: in general, unit charge for express logistics service is higher than that for ordinary logistics service, mainly because of its stricter requirements on delivery timeliness. (2) Express logistics orders are generally of smaller size or weight: express logistics parcels often have maximum weight within 20–30 kg. Some companies, occasionally, would increase the maximum weight to 50 kg, but rarely above that. (3) Demands for express delivery service are fragmented by time and space: spatial fragmentation means the initiating locations of demands are uncertain and the pick-up locations are dispersed; timing fragmentation means the initiating times of demands are uncertain, with high frequency and short response time. (4) Express logistics has higher requirement for the capability in whole-process

tracking: this requires an information system possessing the capability in real-time tracking and query. (5) Express logistics has higher requirements for safety: in particular, the e-commerce express parcel service is often carried out by door-to-door pick-up and delivery, which reveals the customer's home address and other detailed personal information, exposing them to potential safety concerns.

6.1.3.2 Operating Models of Express Logistics Enterprises

In terms of attribute of service, express logistics enterprises in China, often acting as 3PL operators, serve a variety of enterprises, including particularly e-commerce retail platforms. In terms of operating models, most express delivery enterprises are equipped with their own warehouses and trunk vehicles. However, in areas of scattered terminal outlets, different express delivery enterprises adopt either franchising or self-operated models. Enterprises operating their own express delivery outlets have own couriers and terminal delivery vehicles, by which they can impose strict control standards and quality of terminal service. However, this model requires large amount of investments at the initial stage of business establishment and results in a slower expansion of its outlet networks. On the other hand, the franchised model of express delivery outlets facilitates more rapid expansion of networks and requires less investment funds. Yet it is more difficult for the franchised model to strictly control its service standards and quality. At present, most express delivery enterprises mix the self-operation and franchised models; for better control in major cities and areas with huge demands, most of them would adopt the self-operation model.

6.2 Environment for Express Logistics Development in China

Express delivery industry grows rapidly in China mainly because of the fast growth in demands for online retails and the improved environment for industrial development. In recent years, China has issued various regulating, guiding and stimulating policies for the express delivery market. Demands are rising steadily, the industrial chain is improved gradually, and the capital market is quickly responding to the express delivery industry. In addition, new technologies such as Internet, big data and AI are also facilitating the transformation and upgrading of express delivery industry, making it a major experimental site for applying new technologies in the logistics industry.

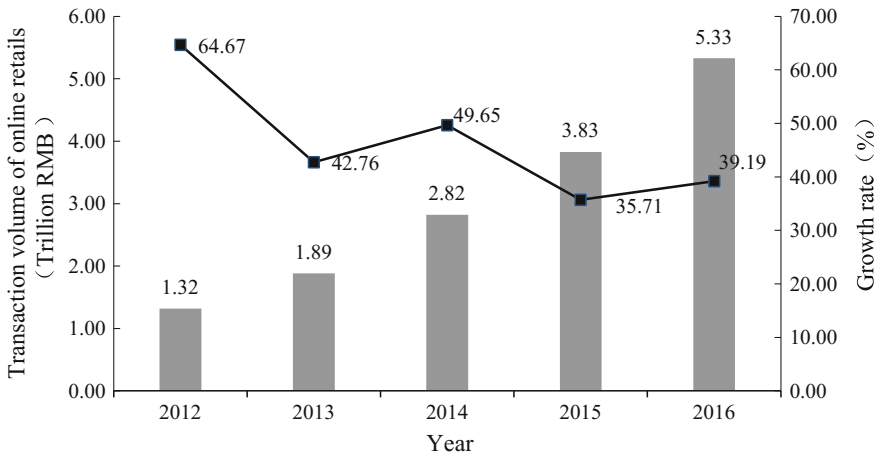


Fig. 6.2 Online retail volume and growth rate in China for 2011–2016. *Source* Compiled from *Report on Data of Online Retail Market in China for 2011–2016*, by China E-commerce Research Center (CECRC)

6.2.1 Transaction Volume of Online Retails Grows Rapidly

Since 2010, the emerging consumption industry has embraced the rapid growth wave in China. Online retailing is now an important channel for Chinese residents to carry out their daily consumptions. According to data published by the State Statistics Bureau, the total retails of consumer goods in China for 2016 reached 33.23 trillion RMB. Also in 2016, according to data issued by the China E-commerce Research Center (CECRC), transaction volume of online retails reached 5.33 trillion RMB, rising by 39.2% from the previous year. In the past five years, total volume of online retails in China had risen rapidly with an imputed annual growth rate reaching 41.7%. In addition, the proportion of online retail volume in the total retails of consumer goods (including online and offline retails) for 2016 has amounted to 16.04%. See online retail volume and growth rate for 2011–2016 in Fig. 6.2.

6.2.2 Innovative Express Logistics Demands Targeted at Production and Life Service Are Emerging

As Internet economy accelerates in China, time-designated logistics demands for small parcels emerge in agriculture, manufacturing and service industries, raising new requirements for innovations in business forms in express delivery enterprises. For instance, XIAOMI, HUAWEI and other mobile phone manufacturers outsource the customized sales logistics service to SF Express, thus expanding the new supply chain service in which express delivery enterprises serve manufacturers. Also, as

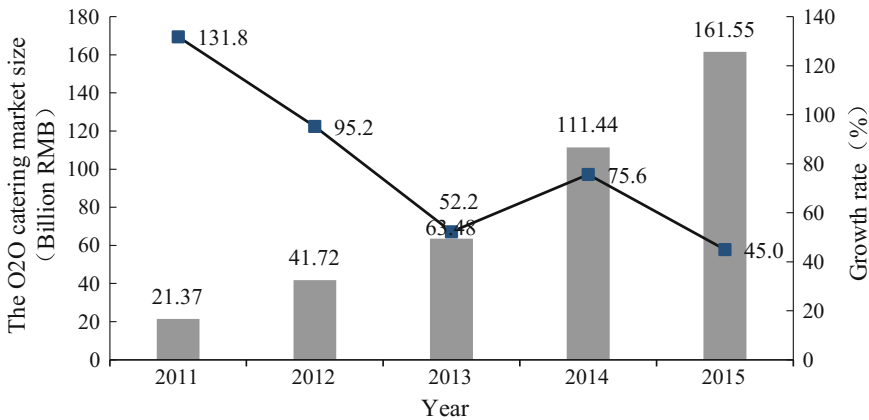


Fig. 6.3 O2O catering market size and growth rate in China for 2011–2015. *Source* Compiled from the *Report on O2O Takeout Industry in China* for 2016, released by iResearch

the Internet O2O² sector of local life service arose, the express delivery enterprises began to expand the special form of service, including (1) door-to-door delivery service needed by takeout, meal delivery, and shopping agent; (2) express delivery of gifts emphasizing customer experience; (3) “cyclic purchase” service featuring “one order followed by periodic delivery” of fresh milk, snacks and vegetables; and (4) time-designated service. The O2O business, typified by takeout meals in local life service, has greatly expanded the demands for express logistics service. In 2015, the O2O catering market³ size in China reached 161.55 billion RMB, growing by 45.0% YOY, accounting for 5.0%⁴ of the total market size of catering industry in China. Figure 6.3 shows the O2O catering market size and growth rate in China for 2011–2015.

²The local life O2O service mentioned in this report refers to various life service business, including “residents making online query, booking, payment, then either visiting the offline shops or receiving home service or door to door service. These services often includes food and drink, shopping agent, entertainment, leisure, beautician service, house-keeping, home education, hotel tickets, wedding and pre-school education, etc. iResearch statistics reveal that in 2015, the local life O2O service market in eight sectors in China, namely, food and drink, leisure and entertainment, beautician service, hotel, wedding, parenting, tourism, and education, reached 879.7 billion RMB.

³This refers to the catering transaction and service which involve online processes (including, but not limited to, payment and ordering) and offline substantive services or experience. The scope of statistics encompasses the following business types: firms offering discount to attract consumers order online, and complete the transaction offline; closed transaction loop in which firms building up a community based on food menus, zeroing in on targeted users, through the users’ sticking nature of the platform, to guide them place online orders; catering businesses making sales through takeout delivery service; firms providing software tools for catering businesses.

⁴Source: Compiled on the basis of iResearch *Report on O2O Takeout Industry in China* for 2016 [EB/OL]. <http://wreport.iresearch.cn/uploadfiles/reports/636042008043042788.pdf>, 2016.

6.2.3 Various Plans, Policies and Standards Issued for the Express Delivery Industry

The State Post Bureau of China is the responsible administrative office for supervising the express delivery industry. In recent years, various departments of the government keep solidifying the reform and issuing a number of policies to improve the policy environment of the express delivery industry. Also, since express delivery industry is closely related to e-commerce and other Internet industries, many plans and policies for the emerging Internet industry issued by the governments also involve the express delivery industry. These policies, plans and standards have notably improved the policy environment for the industrial development. Table 6.1 states the policies issued by the governments of all levels in China in recent years.

At the same time, relevant government departments are also striving to set pertinent standards for express delivery logistics in China. More details are listed in Table 6.2. In terms of their types, the standards of express delivery logistics in China include: (1) operations standards, e.g., regulations on work and operational safety, regulations on terminal delivery services, and regulations on fee-collecting services; (2) standards on tools and equipment, e.g., standards on express waybills, e-waybills, intelligent express boxes, and electric tricycles; (3) information standards, e.g., regulations on information swap, regulations on information tracking and query, and basic requirements for security level and protection of information system.

6.2.4 Emerging Information Technology Accelerates Applications

First, Internet-based e-commerce technologies have pushed forward the professional development of express logistics. E-commerce allows users to complete the process of information retrieval, ordering and payment on the Internet while providing fundamental information platform and data support for logistics and delivery. As e-commerce industry in China is accelerated, the express delivery industry is exhibiting certain professional characteristics different from that of the traditional logistics in terms of facilities, equipment, organizational form, information system, and operating procedures.

Second, the information, big data and intelligent technologies are being adopted swiftly. As Internet revolution deepens, information technology has developed rapidly in perceiving and obtaining information, wireless and express transmission of information, intelligent receipt and intelligent processing, thus stimulating the systematic reforms in economy, industry and livelihood. In the field of express logistics, information sharing and big-data technologies on the Internet have promoted cooperation between upstream and downstream entities, thus improving the capability of monitoring the entire process of express logistics. Intelligent processing technologies also push forward the development of automatic technical equipment that supple-

Table 6.1 Some policies and plans related to express logistics in China

No.	Time of issuance	Issued by	Policy documents	Contents related to express logistics
1	2015-10	The State Council	Several opinions of the state council about promoting the development of express delivery industry	Puts forward China government's guiding ideas, basic principles and development goals in express delivery industry; proposes the major tasks of fostering and expanding express delivery enterprises, pushing forward "Internet+" express delivery, building and improving service networks, connecting to the comprehensive transportation system and enhancing the safety supervision in the industry
2	2013-01	The Ministry of Transport	Regulations on express delivery market	Makes detailed regulations on the operating subjects, the services and safety of the express delivery industry
3	2016-03	The Ministry of Commerce, the NDRC, the Ministry of Transport, the General Administration of Customs, the State Post Bureau and the Standardization Administration	Special plan on developing e-commerce logistics in China (2016–2020)	Explains current development and puts forward the guiding ideas, development goals, major tasks, key projects and implementation assurance measures for e-commerce logistics development. Focuses on the project of expanding express delivery to the Western regions and rural areas in China, and proposes specific policies on cross-border e-commerce express delivery network, data connection between express delivery and online retail, the Last Mile express service, and green and innovative express logistics
4	2016-07	The NDRC	Opinions on implementing "internet + efficient logistics"	In light of shortfalls in logistics development, pushes forward structural reform in supply side and proposes the guiding ideas, basic principles, development goals, major tasks and specific policies for "Internet + efficient logistics."

(continued)

Table 6.1 (continued)

No.	Time of issuance	Issued by	Policy documents	Contents related to express logistics
5	2016–12	The State Post Bureau	The 13th five-year plan for post development	Puts forward the status, guiding ideas, development goals and major tasks of express delivery industry in 2016-2020, and clarifies the holistic strategy for developing China's post industry for the next five years
6	2016-11	The State Post Bureau	Guidance on promoting innovations and researches in post industry	Puts forward the guiding ideas, basic principles, development goals, key tasks and implementation assurance measures to solve the problems in express delivery industry, such as weak foundation in innovation, insufficient coordinated planning, poor awareness of responsibility, and lack of R&D investments
7	2015-05	The State Post Bureau and the Ministry of Commerce	Guidance on expanding express delivery industry in western region and rural areas	Puts forward guiding ideas, basic principles, development goals, major tasks, and assurance measures for express delivery service networks to expand to the Central and Western Regions and rural areas in China
8	2015-11	The State Post Bureau and the Ministry of Education	Guidance on accelerating vocational education in post industry	Puts forward guiding ideas, basic principles, targets, educational system building, quality improvement and assurance mechanism, to facilitate vocational education and improve quality of HR in the post industry
9	2015-12	The State Post Bureau	Provisional regulations on intelligent express box service	Makes regulations on the operations, usage, and duties of intelligent express boxes in express delivery industry

ments logistics operations, such as automated sorting line, AGV, global positioning, route optimized terminals, inbound/outbound scanning, and e-waybill devices. At present, as new technologies such as deep learning and human-less equipment develop, the technical equipment in express logistics will be incessantly upgraded and transformed. As a result, the operating efficiency and overall level of logistics will continue to improve.

Table 6.2 Major express delivery standards issued in China in 2012-2016

No.	Type of standards	Issued in	Standard no.	Name of standard
1	National standard	2012	GB/T 28582-2012	Express waybill
2	Standard for post industry	2016	YZ/T 0153-2016	Regulations on delivery information exchange in express terminals
3	Standard for post industry	2016	YZ/T 0152-2016	Basic requirements on security level and protection of information system
4	Standard for post industry	2016	YZ/T 0150-2016	Regulations on setting intelligent express boxes
5	Standard for post industry	2015	YZ/0149-2015	Regulations on express delivery work and operations safety
6	Standard for post industry	2015	YZ/T 0148-2015	Express e-waybills
7	Standard for post industry	2015	YZ/T 0147-2015	Guidelines on protecting personal information in delivery service
8	Standard for post industry	2015	YZ/T 0145-2015	Regulations on express terminal delivery service
9	Standard for post industry	2015	YZ/T 0141-2015	Guidelines on exchanging information of express fee-collection service
10	Standard for post industry	2015	YZ/T 0137-2015	Basic requirements for design of express delivery outlet
11	Standard for post industry	2014	YZ/T 0136-2014	Technical requirements for express electric tricycles
12	Standard for post industry	2014	YZ/T 0135-2014	Methods of measuring greenhouse gas emission in express delivery industry
13	Standard for post industry	2013	YZ/T 0133-2013	Intelligent express boxes
14	Standard for post industry	2013	YZ/T 0131-2013	Regulations on tracking and querying express items
15	Standard for post industry	2013	YZ/T 0134-2013	Regulations on express delivery fee-collection service

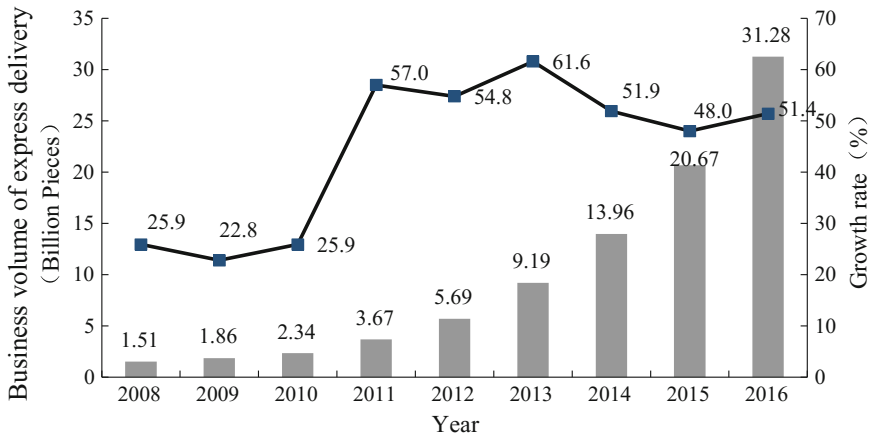


Fig. 6.4 Business volume and growth rate of China’s express delivery enterprises for 2008–2016. *Source* Compiled from the *Bulletin of Statistics of Post Industry in China for 2008–2016* by State Post Bureau

6.3 Current Development of Express Logistics Industry in China

Express logistics industry in China has kept a rapid growth while making progress in its service capability, operations level, scale of industry, market concentration, technical equipment, and management level. As express delivery enterprises speeding up the IPO, its overall landscape in the industry has become stable. However, market competition remains very fierce. Some niche service fields and processes start to emerge as the new focus in industrial development.

6.3.1 Market Size Ranks Highest in the World

Express delivery in China has maintained a rapid growth. Prior to 2010, express deliver was just starting with an annual growth rate of business volume at above 20%. Post 2010, demands for e-commerce retails started to explode, greatly impacting the express delivery industry, whose annual growth rate jumped notably. During 2011–2016, China’s express delivery industry has sustained a swift growth with the average annual growth rate of business volume reaching 53.50%. In 2014, China finished 13.96 billion pieces of express delivery, exceeding that of the US for the first time and becoming the world’s largest country in express delivery. In 2016, China completed 31.28 billion pieces of express delivery, rising by 51.4% YOY, with the total volume ranking No. 1 in the world. Figure 6.4 shows the business volume and growth rate of China’s express delivery enterprises for 2008–2016.

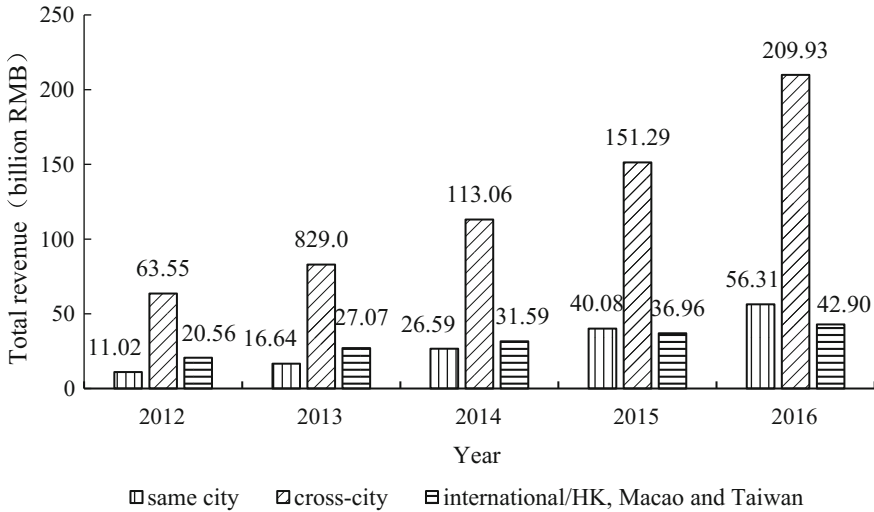


Fig. 6.5 Proportions of revenues made in various types of express delivery for 2012–2016. *Source* Compiled from *Bulletin of Statistics of Post Industry in China for 2008–2016* by State Post Bureau

6.3.2 *Focuses on Cross-Regional Service and Rising Professional Level*

The business structure of express delivery logistics reveals that the industry is predominately of medium and long-distance cross-city express delivery, followed by same-city express delivery and international/HK, Macao and Taiwan express delivery. During 2012–2016, all three types of express delivery services in China maintained rapid growth in revenue; ranking of the proportions of these three types of express delivery in total business remained unchanged, with cross-city express delivery taking the highest proportion. As shown in Fig. 6.5, in 2016, the same-city express delivery achieved a total revenue of 56.31 billion RMB, rising by 40.5% and accounting for 18.22% of the total revenue; cross-city express delivery achieved a total revenue of 209.93 billion RMB, rising by 38.8% YOY, and accounting for 67.91% of the total; international/HK, Macao and Taiwan express delivery achieved a total revenues of 42.9 billion RMB, rising by 16.1% YOY, and accounting for 13.88% of the total.

As the business volume of express delivery expands quickly, it is also becoming more professional. First, its operating region becomes more specialized. For example, in addition to all-network express delivery enterprises, such as SF Express, STO Express, YTO Express, ZTO Express and Yunda Express, which have the same-city, trans-province and international service capability, some small enterprises such as FLYON and Red Cap focus on same-city distribution service while providing local delivery service for the all-network express delivery enterprises. EMS, relying on its postal channel, takes dominant position in delivering cross-border e-commerce small

parcels. Second, its business type is becoming more specialized. For instance, SF Express has advantages in delivering business letters. STO Express, YTO Express, ZTO Express, Yunda Express and ZJS Express mainly serve the fields of common e-commerce parcels. SF Express Cold Chain mainly provides cold-chain home delivery service of fresh agricultural products, and other quasi-express delivery enterprises,⁵ such as RRS, JD Logistics, YUNNIAO, possess greater capability in delivering large-piece items (including furniture and home appliances of large size and heavy weight).

Third, many operating processes and supporting services in express logistics are becoming more professional. Independent professional enterprises begin to provide supporting service for large express delivery enterprises. For example, China Railway Express and Deppon Logistics provide transport services for express delivery trunk lines; Sposter and Hive Box provide receiving service for intelligent express boxes; CAINIAO YIZHAN provides package receiving platform service; CAINIAO GUOGUO provides App service for querying and sending express parcels; BAIC Yinxiang and Tianjin Qingyuan provide express delivery enterprises with new-energy electric vehicle service.

6.3.3 Synergetic Development with Online Retailers and Industry Sectors

Logistics service required by online retailers is often for small-sized common goods with time constraints. Characteristics of express logistics service are consistent with the requirements of online retailers. As a result, online retailers and express logistics exhibit the trend of mutually-supporting and parallel growth. According to the State Post Bureau, of the e-commerce online retailers, 75% of purchased goods need physical delivery. At present, the four major enterprises of express delivery, namely, STO Express, YTO Express, ZTO Express and Yunda Express, have 70% of their parcel business generated from the demands of online retailers. Express delivery and online retailers have entered the coordinated development phase of intensive mutual penetration.⁶

For example, the online retail platforms of Alibaba Group, such as TMALL, Taobao, and IDLEFISH, adopt the model of outsourcing logistics. By establishing

⁵In China, express delivery operators have to apply for special service license to the Post Bureau. Strictly speaking, only those operators having approved qualifications are bona fide express delivery enterprises. Nevertheless, because of the poorly-developed market management mechanism, and due to the rapid innovation in the industry, some operators that provide same-city logistics service are also providing same-city door-to-door service for small parcels. They even compete directly against parcel business of express delivery enterprises. Such operators include Spider, Yunniao, Lanxiniu and New Dada are referred to as “quasi-express delivery operators” in this report.

⁶China E-Business Research Center; since 2010, 70% of business volume of express delivery companies comes from e-commerce [EB/OL]. <http://b2b.toocle.com/detail--6135477.html>. 2013-11-13.

partnership with express delivery enterprises, they can achieve the whole-process express delivery of goods. Express delivery enterprises that provide service for these platforms cooperate closely with them in aspects of information system, promotional plans, and cloud warehousing networks, thus bolstering the efficiency of their synergetic service.

In addition to ordinary online retails, express delivery logistics in China have started to spread into service chains of many industries, thus realizing synergetic development with them. For instance, in the field of traditional distribution, JD expands the O2O retails in collaboration with offline chain shops of ZONECO. By so doing, the customers can place their orders online, and then the express delivery couriers will pick up the ordered goods from the nearest chain shop and make the door-to-door delivery, thus creating the O2O synergy model between express logistic service and chain retails.

Also, in the field of fresh agricultural products and foreign trade, SFBEST provides cross-border retail service of salmon fish from Norway. Adopting the model of two-stage logistics featuring “direct overseas purchase + air transport + cold-chain home delivery,” it accomplishes the direct foreign trade of fresh agricultural products, thus shortening the logistics chain of traditional foreign trade of agricultural products.

Furthermore, in the field of manufacturing, Shandong Post Express Logistics has established a special taskforce to serve Haier Group and CNHTC Jinan. By providing the “Spare Parts Supply Chain” service, it meets the demands for customized production of vehicles. It is the innovative service model adopted by express delivery enterprises to service supply chain in manufacturing industry via “inbound-to-factory” logistics service.

6.3.4 Exploring Multi-modal Transport and Existing Resources

In terms of the means of transportation, express logistics in China has shifted from reliance on highway transport to multiple means of transport including aviation, railway and waterway transportation, and begun to engage in multimodal transportation featuring synergy. For instance, by November 2016, SF Express has owned nearly 15,000 operating vehicles and 13,000 highway outlets in mainland China. In addition, it has also owned 36 all cargo carriers and established aviation networks with Shenzhen and Hangzhou as hubs reaching all the regions in China. This exemplifies that leading enterprises such as SF Express have already started to get into highway and aviation express transportation.

In 2013, China Railway Corporation, after finalizing its corporate reform, had begun to use high-speed railway to transport express mails. In October 2016, China Railway Corporation declared that from October 20, 2016 on, it would provisionally provide high-speed railway express delivery service at all of China’s 505 cities with high-speed railway stations, with service products covering business documents

and e-commerce parcels. Its goal is to build the express delivery network which covers municipalities, provincial capital cities, prefecture-level cities in the Central and Eastern Region of China, and the economically developed counties. Incorporating high-speed railway lines into express delivery service network will expand the optional models of express delivery transportation, thus changing the express delivery operating pattern in some regions to a certain extent.

In June 2016, Tianjin Municipal Government transmitted the *Plan of Implementing Tianjin (China) Cross-border E-commerce Comprehensive Pilot Test Zone*, which proposed that “it is necessary to take advantage of the seaport and airport in Tianjin, gradually improve the entire industrial-chain supporting system, including warehousing logistics, distribution and delivery, trade service, and offline experience that adapt to cross-border e-commerce; to support Dongjiang Bonded Area in exploring the benefit of liner transportation for marine express delivery service between Korea, Japan and China.” The document actually ascertains that Tianjin Port will leverage its advantages in shipping route and the proximity with Korea and Japan to explore the tactics of liner express delivery.

In addition, as an emerging logistics sector, express delivery logistics has begun integrating the traditional logistics resources, sped up the reform and reuse of facilities and equipment in traditional logistics industry, and achieved synergetic innovation with traditional logistics service, and improved the whole-process logistics efficiency.

In terms of integrated use of traditional logistics resources, express logistics has transformed and reused the inefficient and idle resources of traditional logistics. For example, many express delivery enterprises, when expanding their business, have integrated numerous traditional storage warehouses by way of leasing and acquisition. Coupled with sorting equipment and information system, they have greatly increased the proportion of “Integrated Warehousing/Distribution” type of warehouses. CNSS and Best INC. entered this field early. CNSS provides many enterprises with express delivery warehousing and distribution service, thus winning a name among the “Top Ten Express Delivery and Warehousing Service Providers” from CECA (China Electronic Commerce Association). “Best Cloud Warehousing” service provided by BEST INC. integrates traditional warehouse resources in many regions to build its standard operations, thus providing enterprises with multiple services, such as “sub-warehouse relocation, inbound platform, route optimization, and parcel tracking.”

6.3.5 The M&A and IPO Procedures Are Accelerated

During 2015–2017, the express logistics enterprises in China had sped up their merger and acquisition actions; express delivery enterprises made frequent movements in financing, M&A and IPO. In particular, many leading express delivery enterprises in China, such as SF Express, YTO Express, STO Express, ZTO Express, and Yunda Express, finalized their respective IPO in 2016, signifying the acceleration of a new round of merger in the industry. These moves to a certain extent have ameliorated

the shortfalls of low concentration, disparate operations and weak corporate strength of the industry.

Financing actions for express delivery firms were active in 2016. In February 2016, TTK Express received 0.6 billion RMB of A-round financing; Yunda Express received financing from the Fosun Group and the Ping An of China. In May, Fast Express received 0.25 billion RMB of A-round financing; in June, Uni-Top Express received 15 billion RMB financing.

In terms of M&A, in May 2016, FedEx acquired TNT; the joining hands of two industry giants certainly began to exert influence on China's express logistics market. In January 2017, SUNING Logistics acquired TTK Express.⁷

In terms of IPO, between the end of 2015 and the beginning of 2017, SF Express, YTO Express, STO Express, ZTO Express and Yunda Express, as well as many other private enterprises of express delivery, had finalized their IPO, respectively, in the domestic and overseas capital markets. In October 2016, YTO used DAYANG TRANDS to make the back-door listing in the A-share market in Shanghai Stock Exchange, whose market value reached 17.5 billion RMB. In October 2016, ZTO Express was listed in the New York Stock Exchange, issuing 72.10 million shares and collected 1.4 billion USD in the US, becoming the largest IPO in American market in 2016. In December 2016, STO Express used IDC to make the back-door listing in Shenzhen Stock Exchange. In January 2017, Yunda Express was listed in the A-share market in Shenzhen Stock Exchange. In February 2017, SF Express regrouped Ding Tai Xin Cai to get listed in the A-share market in Shenzhen Stock Exchange.

6.3.6 Improved Technical Equipment and Innovated Service Models

At present, China's express delivery enterprises have improved their technical and equipment level in the following three aspects. First, they can transmit and obtain operations information on a real-time basis via information system to improve the extent of visualization. For example, the express delivery industry uses the RF scanning and GPS/GIS tracing technology extensively so that the operations of express logistics become more transparent. Second, they use new equipment to improve operations efficiency. Automated sorting machine of express mails and the X-ray machines for security monitoring are being widely used. These technologies play an important role in improving the operations efficiency of express logistics and enhancing the safety supervision over express mails. Third, use of big data in the industry helps optimize the corporate operations tactics. For example, the HUMIN-BIRD Logistics team of ele.me that serves food catering via O2O can help select the delivery driver and optimize the driving route according to the daily real-time takeout

⁷56zhiwen, Investments & Financing in Logistics Industry in 2016 [EB/OL]. <http://mt.sohu.com/20170101/n477528905.shtml>. 2017-01-01.

demands. Besides, the optimization plan can be updated based on the accumulated big data so as to further improve the delivery efficiency.

In addition, the express delivery industry in China, by making innovations in business models, improves its service capability and quality. For example, the innovative express delivery platform business model of CAINIAO, by integrating the orders of the e-commerce platforms, and giving them to the express logistics enterprises on the platform can optimize the express logistics distribution network and the choice of logistics suppliers, based on the supply-demand big data. Also, RRKD and DADA adopt the crowd-sourcing model. By using a reliable and stable information system, they provide real-time online matching service for suppliers and demanders of same-city express parcels, thus making positive attempts to integrate express delivery resources and improve service efficiency.

6.3.7 Accelerating Green Development

The philosophy of green logistics, such as new energies, green and environmentally-friendly development and recycling of express carton boxes, has drawn increasing attention from the industry. The Yiside express carton boxes that can be recycled are being used in express parcels of VIP, JUMEI, Three Squirrels, and other e-commerce business. This type of carton boxes is not sealed by adhesive tapes and can be recycled, representing the efforts of packaging companies to achieve green development of express carton boxes from the perspective of product design and technical invention. Also, to solve problems such as urban traffic and emission pollution caused by express delivery vehicles, Tianjin Post Bureau, along with the Traffic Control Administration and the Department of Transportation have accelerated the issuance of permits for specialized express delivery vehicles. In 2015, 2709 permits for postal express delivery were issued, thus effectively alleviating the once difficult access problem of express delivery vehicles. At the same time, the government has convened Working Meetings to promote the use of new-energy vehicles, to encourage Tianjin express delivery enterprises to sign strategic cooperation agreement with new-energy companies, and support employees in express delivery enterprises to personally purchase new-energy vehicles. In 2015, local express delivery enterprises in Tianjin purchased additional 629 new-energy vehicles, ranking No. 1 among all provinces in China, and considerably enhanced the green development of express delivery in Tianjin.

6.4 Existing Problems and Development Trend in China's Express Logistics

While express delivery enterprises in China are developing rampantly, the industry is also confronted with problems such as vicious price competition, lack of safety in express mails delivery, and “warehouse overflow” in busy seasons. In the future, China's express delivery industry will sustain its steady growth, improve its technical level, upgrade the synergy between downstream and upstream firms along the industrial chain, and move towards more intensive and sustainable development.

6.4.1 Problems Existing in Express Logistics Delivery in China

6.4.1.1 High Degree of Homogeneity in Express Delivery Service with Keen Price Competition

Express delivery enterprises in China are featured by high degree of homogeneity, with vicious price competition as the chief marketing lever. The whole-network enterprises such as YTO Express, STO Express, ZTO Express and Yunda Express operate by way of franchising. Regional franchisees are disparate in service quality; a number of them are of small size and have low-level of service quality. Meanwhile, because of the low threshold of entry, some regional markets abound with newly-entered small operators, which possess little value-added services or niche services. They therefore resort to price competition as the main marketing tactic. As a whole, the express delivery industry in China is characterized by low profitability and flimsy competitiveness.

6.4.1.2 Safety Threats Still Exist in Express Mail Inspection and Privacy Protection

First of all, though the Chinese Government continues to issue relevant measures on safety management,⁸ yet many enterprises still adopt the traditional crude inspection operations rather than employing the modern security inspection equipment; this practice compromises the mail receipt inspection standards and regulations. Second, express delivery enterprises still need to enforce the regulations on protecting the

⁸In November 2015, the State Post Bureau pushed forward the reform of real-name receipt and posting of express mails, requiring that the senders provide ID number on the order form. In November 2015–March 2016, special campaign was organized to promote “receipt inspection + real-name receipt and security inspection.” Operationally, this means when accepting the mails, the operators will inspect the mails, and require the senders to provide actual personal ID number, then X-ray the express mails for security check before processing them.

private information of its customers. There is an apparent failing in guarding the safety of delivery channels and user information. Evidently, China still needs to improve its privacy protection legislation, model design and systems institution. Finally, the quality of express delivery workforce is relatively below par, the “last-mile” service system is still unsound, and there still exists the possibility of couriers committing house theft.

6.4.1.3 Quality and Professional Service Level yet to Be Upgraded

First, concerning the quality of express delivery service, consumers are still filing numerous complaints regarding delayed delivery and lost parcels. Second, in terms of the professional service level of the express delivery industry, the capability in delivering special products such as agricultural products, medicines, and hazardous products needs to be upgraded. Third, the “last-mile” delivery service in express logistics still causes the highest rate of complaints. Problems plaguing the “last-mile” service include difficulty in navigating delivery vehicles through the urban streets, and poorly-managed franchised shops and self-pickup boxes. Furthermore, the professional service level of “last-mile” delivery still needs improvement in some regions such as rural areas, urban communities, and commercial districts. Fourth, the problem of “warehouse overflow” due to insufficient capability of express delivery service during high season also impacts on the quality of express delivery service. Besides, small- and medium-sized express delivery operators are still confronted with problems of crude management, high turnover rate and inadequate training of employees.

6.4.2 *Development Trend of China’s Express Delivery Logistics*

6.4.2.1 AI Technologies Will Facilitate the Intelligent Operations of Express Logistics

As new-generation Internet, IoT, cloud computing, big data and AI technologies develop rapidly in China, they will provide new solutions to the operations and management of express delivery enterprises. In the future, as deep learning, machine visioning, intelligent audio, and unmanned technologies develop, China’s express delivery industry will elevate its automation and intelligence development in logistics operations. To date, to solve its “last-mile” delivery problem, SF Express has begun to experiment with the use of UAV and to engage in the development of driverless technologies. As China implements the innovation-driven strategy and as its high-tech enterprises hasten the technological development, these efforts will lay a foundation for express delivery enterprises to embark on the use of new technologies.

6.4.2.2 Express Delivery Will Speed up the Pace of “Going Abroad”

As China pushes forward the Belt and Road Initiative, and speeds up its development of “Internet + foreign trade” and cross-border e-commerce, express delivery enterprises will strengthen their overseas express delivery service networks and improve their capability in providing global express delivery services. In the future, China’s express delivery enterprises will provide overseas logistics and express delivery services for importers/exporters and cross-border e-commerce importers/exporters, thus attaining their goal of globalized development. At present, EMS, SF Express, STO Express, YTO Express, ZTO Express and Yunda Express have all set up networks in the US, Europe and certain Asian countries, in an effort to establish their globalization layout.

6.4.2.3 Express Delivery Industry Will Hasten the Development of “One Stop” Supply Chain Service Capability

While the logistics industry improves its service capability and integrates with other industries, its enterprises are also expanding their professional logistics and supply-chain services. On the one hand, express delivery service will evolve into the synergistic and integrated development with the fields of urban delivery and same-city timed delivery, with the less-than-truck-load express delivery of trunk logistics, and with the “integrated warehousing & delivery” service of warehousing logistics. This expanded capability will afford the clients with customized whole-process logistics services. On the other hand, some express delivery enterprises are also accelerating their third-party logistics and supply-chain integration service, to provide a “one-stop” supply chain service for the clients.

6.5 Summary

Section 6.1 of this chapter introduces the basic characteristics and operating models of express logistics in China. Section 6.2 explains the development environment of express logistics in China, the huge market demand for logistics, the perpetual emergence of new types of demands, the constant issuance of policies, plans and standards, and the continual upgrades of technical level. Section 6.3 discusses the current development of express logistics in China. Express logistics in China has recently maintained a rapid rise and improved its professional capability. It has constantly improved its coordinated development with online retailing and other relevant industries, adopted various means of transportation to enhance integration with traditional warehousing and transportation resources. Besides, express delivery market in China has accelerated its integration. Many enterprises have been listed in the domestic and global stock markets. Technical equipment, service innovations and capability in green development have been enhanced. Section 6.4 analyzes the existing prob-

lems in China's express logistics, including the homogeneity and price competition among the firms, the latent safety risks, and the inadequate service quality. It also projects a future trend of intelligent and internationalized development of the express logistics in China.

Chapter 7

Development of Multimodal Transport in China



Jian-hua Xiao and Xia Liu

Multimodal transport implies forming the efficient, convenient and safe transportation service network and providing door-to-door logistics service for owners of goods by leveraging the advantages of railway, highway, waterway, and air transportation. In recent years, China keeps optimizing the environment for multimodal transport, improving its infrastructures and upgrading the technological level of rapid-transferring equipment. Step by step, China is establishing the multimodal organizing system featuring integrated service founded on efficient facility connection, rapid transfer at hubs, connectivity and information sharing, and professional standards of equipment.

This chapter includes four sections. Section 7.1 gives an overview of multimodal transport, including the basic concept, categories, major characteristics, operating network and operators of multimodal transport. Section 7.2 presents the development environment of multimodal transport in China, including changes in market demands, policies, measures and regulatory standards. Section 7.3 discusses the current development of multimodal transport in China, including market size, infrastructures, multimodal transport channels, demonstration projects, and equipment level of rapid transfer. Section 7.4 points out the existing problems and future development trend of multimodal transport in China.

7.1 Overview of Multimodal Transport

Multimodal transport system featuring smooth connection is the core representation of comprehensive transportation service level, and constitutes the foundational platform for efficient operations of modern logistics. As an intensive and efficient means

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of transport organization, multimodal transport is characterized by long industrial chain, high rate of resource utilization, and excellent overall benefits.

7.1.1 Basic Concepts and Connotations

Multimodal transport first came into being in the 1960s. After the 1980s, it started to develop rapidly as software and hardware technologies for container became mature. However, due to differences in systems, environments and perspectives, various countries have different definitions about the connotations of multimodal transport.

At present, there are three main definitions of multimodal transport. First, it refers to the form of combined transport involving two or more transport means, as represented by the “*ISTEA*” Act of the US. Second, it refers to the form of transport in which transported goods use the same standard carrying unit or road vehicle, and adopt two or more transport means without altering the mode of goods handling in the transporting process; it is represented by the *Terminology on Combined Transport* of the EU. Third, it refers to using two or more transport means to carry out the complete transportation operations, in accordance with multimodal contract, organized and completed by operators of multimodal transport; it is represented by the *United Nations Convention on International Multimodal Transport of Goods*.

According to China’s national standard, the *Terminology in Logistics* (GB/T 8226-2006), multimodal transport in China is defined as the “activity in which the operators of multimodal transport, entrusted by the consignor, consignee or passenger, conduct two or more means of transport (or two or more transportation sections) while providing relevant auxiliary service of transportation logistics.” According to the *Multimodal Transport Terminology of Goods*, published by the Ministry of Transportation on the standards of the transportation industry, multimodal transport is defined as the “transportation means in which goods are loaded on one and the same carrying unit, and adopt two or more transport means, without processing the goods in the process of rapidly changing the transport means.” In actual operations, all transportation activities finalized by two or more transport means are collectively called multimodal transport.

7.1.2 Main Characteristics of Multimodal Transport

First, multimodal transport involves various means of transportation featured by higher level of synergy and professionalism. Different from singular transport means, multimodal transport involves the effective connection of two or more transport means including highway, railway, air and waterway. Consequently, multimodal transport requires that its infrastructures, freight hubs, logistics parks, transfer facilities/equipment, and information system be well-connected and have higher level of synergy and professionalism among all its linkages.

Second, multimodal transport involves many related industries and has a long service chain. Because multimodal transport needs seamless connection and effective transference among various transport means, involving the construction of transport infrastructures, the standardization and light-weight development of container equipment, and the R&D and application of transfer equipment and apparatuses, it entails in many related industries. Besides, multimodal transport can meet the demands for efficient and environmentally-friendly transport featuring long-distance door-to-door transportation of international goods with a long service chain.

Third, multimodal transport has higher resource utilization rate and less environmental pollution. As a green and environmentally-friendly transport mode, multimodal transport can save on multiple loading/unloading operations, shorten transportation period, considerably reduce transportation cost, decrease congestion, and produce better financial benefit. Besides, it can also reduce carbon emission and noise pollution while increasing the resource utilization rate.

7.1.3 Categorization of Multimodal Transport

7.1.3.1 Based on Transportation Means

(1) Highway-Railway Multimodal Transport

Highway-railway transport refers to, in accordance with highway-railway transport contract, transporting goods from the pickup location to the designated delivery location via highway and railway transport means, by the whole-process transportation operators. Highway-railway transport often uses container as the transporting unit. Through one-time consignment, one-time payment, one sheet and one-time insurance, highway and railway carriers work together to finalize the whole-process transportation of goods. Highway-railway transport is typified by the “piggyback” transport.

(2) Highway-Waterway Multimodal Transport

Highway-waterway transport means, in accordance with highway-waterway transport contract, transporting goods from the pickup location to the designated delivery location via highway and waterway transport means, by the whole-process transportation operators. Highway-waterway transport is typified by the “roll-on and roll-off” transport and the “over-the-dam” transport.

(3) Railway-Waterway (Marine) Multimodal Transport

Railway-waterway (marine) transport means when goods on arrival or departure at port can directly realize container loading/unloading between waterway and railway, and transport to destination without transferring via highway. Railway-waterway transport is featured by larger capacity and fewer intermediary processes, thus greatly improving the logistics efficiency. It is represented by box-back transport and bulk goods multimodal transport (Zhang 2013).

(4) Waterway-Waterway Multimodal Transport

Waterway-waterway transport refers a form of whole-process transportation accomplished by one ship moving along multiple waterways without transferring. It is typified by River-Sea Multimodal Transport. To be specific, the same ship finalizes the whole-process transportation of river and sea. River-sea transport includes two operational parts, river transportation and sea transportation. In China, river-sea multimodal transport is mainly applied in Yangtze River Delta and Pearl River Delta, constituting the major means of transportation for foreign trade.

(5) Train-Air-Truck Multimodal Transport

Train-Air-Truck (TAT) multimodal transport links train, aircraft, and truck to accomplish the door-to-door transportation service; it can better adapt to the modern-day logistics requirements of timeliness and accuracy. It is represented by the bird-back transport.

7.1.3.2 Based on the Location of Origination and Destination

(1) Domestic Multimodal Transport

Domestic multimodal transport implies the form of multimodal transport in which the locations the contracted operators receive and deliver the goods are within the same country.

(2) International Multimodal Transport

In accordance with the United Nations Convention on International Multimodal Transport of Goods, international multimodal transport, in general, refers to the form of transporting goods in which the contracted operators employ two or more means of transportation to transport goods received from one country to a designated delivery location in another country.

7.1.3.3 Based on Type of Organization

(1) Collaborative Multimodal Transport

Collaborative multimodal transport means enterprises with two or more transport means, in accordance with the regulations or agreement, work together to transport goods from receiving locations to designated delivery locations.

(2) Connecting Multimodal Transport

Connecting multimodal transport means one multimodal transport operator (or enterprise) organizes with a transportation enterprise operating two or more means of transport to transport goods from receiving locations to designated delivery locations.

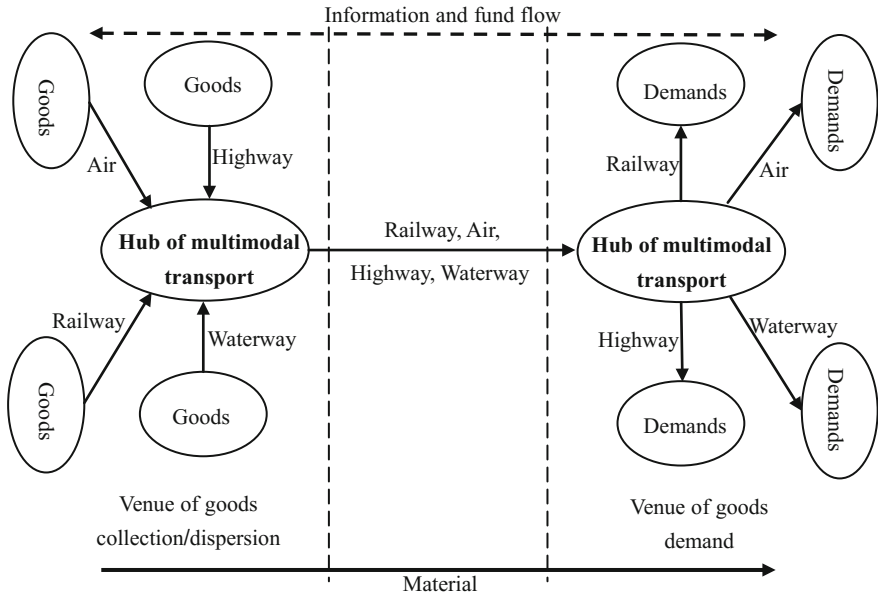


Fig. 7.1 Operating schema of multimodal transport

7.1.4 Operating Network of Multimodal Transport

In general, the process of multimodal transport focuses on multimodal transport hubs in venues of goods distribution and demands. By taking the multimodal transport means such as highway-railway, highway-waterway, railway-waterway, or waterway-waterway transport, and Train-Air-Truck transport, to transport goods from venues of distribution to venues of demands. More details are portrayed in Fig. 7.1.

Multimodal transport hub is the important node in the comprehensive transport network, which can realize convenient conversion and efficient organization of various transport means via facility connection, business collaboration and information sharing. Based on different dominant transportation means, multimodal transport hubs consists of three types, namely, railway-type, air-type and waterway-type hubs. The railway-type hubs are mainly railway depots and railway container center stations; the air-type hubs are built on aviation sites (aviation freight sites); the waterway-type hubs mainly rely on ports (along coastal and inland rivers) (Wang et al. 2016).

7.1.5 *Operating Subjects of Multimodal Transport*

7.1.5.1 Operators of Multimodal Transport

Operators of multimodal transport refer to those that sign multimodal transport contract with consignors and take the whole-process transportation responsibility in the capacity of carriers, such as CRIMT and COSCO Shipping. In the international activities of multimodal transport, only multimodal operators have the right to sign the multimodal transport bill of lading, and bear the responsibility of compensating for losses or damages to the goods in any part of the process of multimodal transport. At present, most operators of multimodal transport are in the field of foreign-trade multimodal transport, focusing mainly on international multimodal transport of containers.

7.1.5.2 Carriers of Multimodal Transport

Carriers of multimodal transport refer to those that specialize in transporting goods, compositing goods or taking responsibility for transporting goods as their main business and charge fees for the service. Carriers of multimodal transport include actual carriers and contracted carriers. Actual carriers include those that control transport vehicles and participate in part of the transportation in multimodal transport, such as railway transportation operators, highway transportation operators and marine transportation carriers. Contracted carriers refer to those that take transportation responsibilities in an explicit or implicit way, such as Non-Vessel Operating Common Carrier (NVOCC) and Non-Truck Operating Common Carrier (NTOCC).

7.1.5.3 Freight Agents

Freight agents refer to those operators who sign transportation contract with carriers in the capacity of consignor on behalf of cargo owners, collect agent fees and take responsibilities and risks as specified in the agent contract; examples are SINO-TRANS & CSC Holdings, CSCCO International Freight, Minsheng International Freight Agent, and other domestic companies in China, as well as international freight agents such as Kuehne & Nagel and DB Schenker.

7.1.5.4 Freight Brokers

Freight brokers refer to those operators that act as go-betweens for transactions between consignors and carriers while collecting commissions. Freight brokers only function as go-between for consignors and carriers, whose responsibility and obligation terminate after the go-between job is finished.

7.2 Development Environment of Multimodal Transport in China

Market environment and policy environment constitute the major foundation for multimodal transport development. In recent years, as its economy enters the New Normal phase and the Three Strategies¹ are implemented, China has issued various policies and measures of multimodal transport and made relevant service regulations and standards. Hence the development environment of multimodal transport has been notably improved.

7.2.1 *The New Normal Economy Stimulates Potential of Multimodal Transport Development*

Under the New Normal economy, development of multimodal transport is shaped by the following three factors.

(1) The logistics industry has accelerated its transformation and upgrading in recent years. As China's economy shifts to the phase of medium-to-high growth rate, its industrial structure accelerates the upgrading, and its economic status keeps optimizing, the structure of its freight demands has undergone some new changes. Growth rates of demands for transporting coal, steel, nonferrous metals, cement and other traditional bulk goods have visibly slowed down. However, freight demands for diverse, timely, small-batch, frequent and one-stop door-to-door transport have grown rapidly; multimodal transport and other advanced modes of organizing transportation featuring greater timeliness and reliability, and integrated services have triggered new demands. At present, logistics industry in China is confronted with problems such as relatively backward transportation services, and ineffectual integrated transportation service level and insufficient comprehensive services. Logistics industry in China needs to take advantage of the comparative advantages and combined efficiency of various transportation means, strive to develop advanced modes of organizing transportation such as multimodal transport, and improve the level of its integrated service capability.

(2) Environmental constraints on traffic and transportation have become more stringent. In recent years, environmental problems have exacerbated in China. It is now a well-recognized trend in China to vigorously develop its green, low-carbon and cycled logistics. As the scale of social logistics expands and the energy consumption and environmental pollution worsen, traditional modes of organizing transportation can no longer meet the current requirements. As a result, China should fully explore the huge potential of multimodal transport in integrating resources, reducing cost, improving efficiency, saving energy, and cutting down on emissions. The country

¹The Three Strategies refer to the Belt & Road Initiative, the Beijing-Tianjin-Hebei Coordinated Development and the Yangtze River Economic Belt Expansion.

must strive to develop the advanced modes of organizing transportation such as multimodal transport, so as to promote the development of green and low-carbon transportation.

(3) New technologies and new business forms have stimulated reforms in transportation modes. At present, the new round of technology revolution and industrial reforms are booming world-wide. The extensive application and deepened cross-area integration of modern information technologies such as Internet and big data are reshaping the forms and the integrated service modes of organizing transportation. These new technologies and new business forms provide new opportunities for multimodal transport to realize seamless connection of various transportation means, and to profoundly integrate information, finance and Customs clearance.

7.2.2 The “Three Strategies” Provide New Opportunities for Multimodal Transport

China’s full-fledged opening-up to the world provides new opportunities for international multimodal transport. As the implementation of the Belt and Road Initiative deepens, China’s trade with countries along the Belt and Road expands rapidly. The railway connectivity and cross-border or trans-regional multimodal transport corridor keep improving. The China-Europe cargo trains develop robustly. In 2016, the import and export volume between China and countries along the Belt and Road route amounted to 6.3 trillion RMB, rising by 0.6% YOY; this amount includes an export volume of 3.8 trillion RMB, an increase by 0.7%, and an import volume of 2.4 trillion RMB, up by 0.5%. In Q1 of 2017, the export and import volume between China and countries along the Belt and Road countries reached 1.66 trillion RMB, rising by 26.2%, compared with the same period of last year; this value is 4.4% points higher than the overall growth rate of foreign trade volume in China for the same period, and accounting for 26.7% of the total foreign trade volume (Xu 2017).

In addition, as the Belt and Road Initiative, the Beijing-Tianjin-Hebei Coordinated Development, and the Yangtze River Belt Expansion strategies are carried out, China’s industries are gradually transferred toward its Western Region in an orderly manner. The hinterland of coastal ports keeps extending to inland China, thus further expanding the market space of multimodal transport.

7.2.3 Policies and Measures of Multimodal Transport Continually Launched

In recent years, the State Council of P.R.C., the Ministries and Commissions have issued a number of policies, development plans and guidelines to steer the multimodal transport industry. See more details in Table 7.1. The multimodal transport policies

released in the past five years evidence that China regards multimodal transport as the major means of using transportation to promote the logistics industry, and it clearly requires building an efficient and smooth multimodal transport system. China is also actively improving the infrastructures of multimodal transport network, and instituting relevant service regulations. At the same time, the Government is actively pushing forward demonstration projects of multimodal transport, building the credit appraisal system and reward/penalty mechanism for operators of multimodal transport, so as to attain a healthy and orderly development of multimodal transport in China.

7.2.4 Multimodal Transport Service Regulations and Standards Keep Improving

In recent years, relevant departments in China have been active in instituting regulations and standards of multimodal transport, improving the technical standards and service regulations on multimodal transport infrastructures, rapid transit equipment and information exchange interfaces, thus pushing forward the standardized and integrative development of multimodal transport.

In May 2008, the General Administration of Quality Supervision, Inspection and Quarantine of P.R.C. (AQSIQ) issued the *Requirements for Service Quality of Multimodal Transport*, which mandates the basic principles of multimodal transport service, the basic requirements for operators of multimodal transport, and the quality of service process, as well as the evaluative indicators of service quality.

In December 2013, AQSIQ and the Standardization Administration of P.R.C. jointly issued the *Service Regulations on Container Freight Agency* (GB/T 30349-2013), which was put into effect on July 1, 2014. It clarifies the business procedures and regulations of import and export freight service for container freight agents, as well as regulations and requirements for international multimodal transport.

In March 2016, the Standardization Administration of P.R.C. approved the issuance of 39 national standards in foreign languages, including the English version of the *Requirements on Service Quality of Multimodal Transport* which was prepared by the National Technical Committee for Logistics Standardization.

In February 2017, the Ministry of Transport of P.R.C. issued the *Terminology for Multimodal Transport of Goods* and the *Logo of Multimodal Transport Carrying Units*, which were put into effect on April 1, 2017 and filled the void in multimodal transport standards. The *Terminology for Multimodal Transport of Goods* contains seven major parts, namely, basic terminology of multimodal transport, equipment terminology, facilities terminology, operations terminology, participants terminology, service and management terminology, and terminology of international multimodal transport. It spells out 49 terms, concepts and definitions of multimodal transport. The *Logo of Multimodal Transport Carrying Units* stipulates the logo system and the logo requirements for multimodal transport carrying units.

Table 7.1 Policies of multimodal transport in China for 2011–2017

No.	Issued in	Issued by	Name of policy documents	Contents about multimodal transport
1	2011-11	Ministry of Transport, formerly Ministry of Railway	Agreement on Jointly Pushing forward Partnership in Railway-Waterway Multimodal Transport	The two ministries will deepen cooperation in six aspects, namely, improving plans of developing railway-waterway multimodal transport, facilitating building of infrastructures, improving supporting policies and standards, enhancing transportation organization, pushing forward information sharing, and fostering leading enterprises
2	2013-06	Ministry of Transport	Guiding Opinions on the Transportation Sector Pushing Forward Healthy Development of Logistics Industry	Consider multimodal transport as the principal focus of using transportation to promote logistics industry
3	2014-10	State Council	Mid and Long-term Plan of Developing Logistics Industry (2014–2020)	Put multimodal transport first among the 12 major projects; encourage development of multiple transportation means including railway-maritime, railway-waterway, highway-railway and land-air transportation, etc
4	2015-07	Ministry of Transport, National Development and Reform Commission	Notification about Conducting Multimodal Transport Demonstration Projects	Implement demonstration projects, apply the rapid transshipment equipment and technologies, and make innovations in models of organizing multimodal transport
5	2016-06	National Development and Reform Commission	Implementation Plan of Building Sound Market Environment and Pushing forward Fusion of Transportation and Logistics	Focus on pushing forward multimodal transport and expanding international multimodal transport service
6	2016-07	Ministry of Transport	The 13th Five-year Plan of Comprehensive Transportation Service	Push forward multimodal transport; grow the quantity of container multimodal transport at an annual rate of 10%. Study the possibility of enacting the <i>Law of Multimodal Transport</i> to enhance the overarching design of developing multimodal transport. Build the channel multimodal transport service system. Improve infrastructures of multimodal transport

(continued)

Table 7.1 (continued)

No.	Issued in	Issued by	Name of policy documents	Contents about multimodal transport
7	2016-10	Office of the Steering Panel for Pushing Forward the Belt and Road Initiative	Plan of Developing China-Europe Cargo Trains (2016–2020)	Propose optimizing the system of organizing transportation, collection distribution, thus improving efficiency and benefits of China-Europe cargo trains
8	2016-12	Ministry of Transport, National Development and Reform Commission	Action Plan of Promoting the Building of Logistics Channels (2016–2020)	Relying on logistics channels, facilitate multimodal transport of railway-waterway (maritime-railway), highway-railway, highway-waterway, land-air, etc. In a holistic way, push forward development multimodal transport systems, respectively for containers, semitrailers and bulk commodities
9	2017-01	Ministry of Transport and eighteen other Departments	Notification about Encouraging Development of Multimodal Transport	Build an efficient and smooth multimodal transport system, and ensure the volume of multimodal freight in 2020 grows by 1.5 times more than that in 2015
10	2017-02	State Council	The 13th Five-year Plan of Developing Modern Comprehensive Transportation System	Develop multimodal transport of bulk commodities and specialty goods; institute improved and uniform rules of multimodal transport and system of multimodal transport operators; try to implement the “Single-Document” multimodal transport service model; speed up the development of technical standards for special equipment and apparatus for railway multimodal transport
11	2017-05	National Development and Reform Commission, Ministry of Transport, China Railway	The 13th Five-year Plan of Developing Railway Container Multimodal Transport	Facilitate the development of railway container multimodal transport; build the integrated, networked, standard and IT-based container multimodal transport system

In the 13th Five-year Plan period, China will actively explore legislations such as the *Law of Promoting Comprehensive Transport* and the *Law of Multimodal Transport* improve the laws and the administrative regulations of multimodal transport, while enhancing the overarching design of multimodal transport.

7.3 Current Development of Multimodal Transport in China

As its market environment and policy environment are improved, China keeps expanding the scale of its multimodal transport, improving the infrastructures of its multimodal transport, facilitating demonstration projects, and establishing the multimodal transport channels featuring efficient connections. At the same time, operators of multimodal transport keep expanding, information platforms are developed rapidly, and rapid transit equipment and technical level are steadily upgraded.

7.3.1 Scale of Multimodal Transport Keeps Expanding

In recent years, China has seen rapid growth in the demand for door-to-door freight featuring diverse, timely, small-scale, frequent and one-stop development. The scale of multimodal transport of container railway-waterway, railway-maritime and waterway-waterway transit keeps expanding.

Container railway-maritime multimodal transport is one of the major means for China's ports to conduct multimodal transport, and an important way for them to develop modern logistics. In recent years, major ports such as Dalian Port, Ningbo-Zhoushan Port and Qingdao Port have been thriving in developing container railway-maritime multimodal transport. In 2010–2015, the scale of container railway-waterway multimodal transport kept expanding in six container railway-waterway multimodal transport demonstration channels implemented at the Dalian, Tianjin, Qingdao, Lianyungang, Ningbo and Shanzhen ports; freight volume rose from 1.41 million TEUs to 2.37 million TEUs, with an annual growth rate of 10.9%. In 2016, volume of container railway-maritime multimodal transport in Dalian Port reached 406,000 TEUs, rising by 17% YOY, including 18,000 TEUs of transit containers, rising by 106% YOY; Qingdao Port finalized container railway-maritime multimodal transport of 480,000 TEUs, rising by 60% YOY; Ningbo-Zhoushan Port achieved over 250,000 TEUs of container railway-maritime multimodal transport, rising by 46.6% YOY.

Waterway and waterway transit, as a modern means of gathering and dispersing goods, has secured rapid growth in recent years in China. In 2015, Shanghai Port finalized 36.54 million TEUs of container throughput, including 16.44 million TEUs of waterway-waterway transit that accounted for 45% of container throughput at the

Port; container waterway-waterway transit in Dalian Port reached 3.43 million TEUs, accounting for 37% of the total container throughput at the Port.

In addition, propelled by the Belt and Road Initiative, the China-Europe and China-Asia container trains also exhibited a trend of rapid growth. In 2016, 1702 China-Europe cargo trains were operated, rising by 109% YOY; the 572 returning cargo trains represented a rise by 116% YOY. By the end of 2016, the China-Europe line had cumulatively operated 2964 trains on 39 routes. In 2016, 646 China-Asia cargo trains were operated with CRIMT as the agent, which finalized 66.2 million TEUs of container multimodal transport.

7.3.2 Accelerated Improvement on Multimodal Transport Infrastructures

China has sped up its improvement on multimodal transport infrastructures in three aspects. First, it has optimized the development of its multimodal transport channels and hubs. For instance, the former Ministry of Railway planned and built 18 railway container hub stations in Harbin, Shenyang, Dalian, Beijing, Tianjin, Zhengzhou, Xi'an, Wuhan, Qingdao, Shanghai, Ningbo, Guangzhou, Shenzhen, Chengdu, Chongqing, Lanzhou, Urumqi and Kunming, which had been completed and put into operation in recent years, thus had considerably upgraded the capacity of transporting containers. For example, in June 2016, the Tianjin Container Hub Station was put into operation, whose two railway loading/unloading tracks and facilities have an annual capacity of transporting 400,000 TEUs.

Second, it has improved the seamless connection of its railway stations and container ports. For instance, in December 2015, the incoming railway into Nansha Port of Guangzhou commenced construction in December 2015, which possesses direct access of container trains to Europe. In 2016, the third incoming railway into Tianjin Port was put into use, thus effectively connecting multiple transportation means. Besides, the Ministry of Transport and China Railway are actively building Phase II of the Wuhan Port Jiangbei Railway and the special route of Changsha Port New-port Railway to speed up the entrance of railway routes to inland ports and bonded ports.

Third, it has bolstered the establishment of multimodal transport hub demonstration projects. For example, Yunan Tengjun International Land Port is the logistics supporting node and basic hub for the Belt and Road construction, and Kunming's efforts in building into a center for reaching South Asia and SE Asia; whose Highway and Railway Multimodal Transport Center is among the first batch of multimodal transport demonstration projects in China. The Government plans to invest 9.06 billion RMB in the freight hub and focuses on developing the integrated supply chain service system featuring "multimodal transport+bonded area," "multimodal transport+trade," and "multimodal transport+cloud platform." Another example is Chengdu International Railway Port, which is among the first batch of multimodal transport Customs Supervision Center and multimodal transport demonstra-

tion projects. It houses the Chengdu Railway Container Hub Station, which is the largest one in Asia, and the International Container Logistics Park that is a leading one in China.

7.3.3 Channels of Multimodal Transport Gradually Taking Shape

In recent years, China has been building the skeleton structure of multimodal transport network featuring ample capacity and efficient connection. Initially, the country has established four domestic multimodal transport channels and four international multimodal transport channels.

The four domestic multimodal transport channels include the following. (1) The container multimodal transport channel in Northeastern Region of China which relies on the container ports of the Northern Region in Dalian, Yingkou, Jinzhou and Dandong, as well as the trunk and branch railways in the Northeastern Region. (2) The container multimodal transport channel in Northern Region and Northwestern Region that starts with Tianjin Port, Qingdao Port and Lianyungang Port and extends west to Lanzhou via Zhengzhou and Xi'an, connecting the Northwestern Region. (3) The container, bulk commodities, Ro/Ro transportation of vehicles and river-sea transit of multimodal transport channel in the Southwestern, Central and Eastern Regions of China; this channel relies on the Yangtze River golden waterways, includes Shanghai, Wuhan and Chongqing navigation centers, the Zhoushan River and Sea multimodal transport service center, and the Nanjing Regional Shipping Logistics Center as the carriers, takes the downstream Yangtze River Delta as the terminals, and extends to the middle and upstream reaches of Yangtze River. (4) The container multimodal transport channel in the Southern Region of China that is based on the Pearl River Delta, and extends to the Central Region and Southwestern Region.

There are four international multimodal transport channels. (1) The Dalian-Manzhouli-Europe-Asia multimodal transport channel. This channel takes Dalian as the bridgehead, leaves China via Manzhouli Port and connects with Siberia Continental Bridge; moving along the Siberian Railway, it passes Moscow of Russia, Warsaw of Poland and Berlin of Germany before reaching the Rotterdam Port in the Netherlands. (2) The Tianjin-Mongolia-Europe-Asia multimodal transport channel. This channel takes Tianjin as the bridgehead, leaves China via Erenhot, enters Russia via Ulan Bator and connects with Siberian Railway; it diverts in Brest and reaches Rotterdam Port in the west. (3) The New Eurasia Continental Bridge, also known as Second Eurasia Continental Bridge. This channel takes Lianyungang as the Bridgehead, relies on Longhai Railway and Lanzhou-Xinjiang Railway, and reaches Kazakhstan via Alataw Pass Port; then it reaches New Siberia in Russia via Central Asia and joins the First Eurasia Continental Bridge Railway, and diverts in Brest of Belarus via Moscow of Russia before reaching Rotterdam Port in the Netherlands. (4) The Suifenhe-Manzhouli-Europe-Asia multimodal transport channel, also known as

the Suifenhe Continental Bridge channel. This channel mainly ships China's goods or transit goods of Japan and Hong Kong to Nakhodka Port or Vladivostok Port in Russia; it reaches Suifenhe via railway, passes Harbin and connects with Siberian Continental Bridge via Manzhouli Port before reaching the Rotterdam Port.

Meanwhile, as the Belt and Road Initiative being implemented, the Chongqing-Xinjiang-Europe, the Zhengzhou-Xinjiang-Europe and other international multimodal transport of China-Europe cargo trains have been developing rapidly. For instance, coffee from Vietnam and Yunnan may first be transported to Chongqing via the Southwestern International Highway Channel, transferred via Chongqing-Xinjiang-Europe cargo trains before finally transported to Europe. In May 2016, Chongqing transported bodybuilding apparatuses of Germany to Singapore via air transport after transiting them on the Chongqing-Xinjiang-Europe cargo trains from Germany.

7.3.4 Multimodal Transport Enterprises Becoming Stronger

In recent years, China has been encouraging qualified traditional transportation and international freight agents to progress toward conglomeration, internationalization and diversification by regrouping or capital and stock expansion, thus improving the integrated service level and comprehensive service capability of multimodal transport.

In March 2016, COSCO Container Lines Co., Ltd. and CSCL were regrouped to form the COSCO Shipping Lines Co., Ltd. The new company has its service networks in Europe, USA, Asia, Africa and Australia to establish the container multimodal transport network featuring global operations and integrated services. By February 2017, it owns 311 container ships whose transport capacity reaches 1.65 million TEUs, rising by 97.6% YOY. Its container fleet ranks No. 4 in the world in terms of operating scale; it operates 332 international and domestic lines covering 254 ports in 79 countries and regions in the world.

Another example is China Railway International Cargo Agency Co., Ltd., the predecessor of China Railway International Multimodal Transport Co. Inc. (CRIMT), which is one of the first operators in China engaging in international cargo agency business; it mainly engages in domestic logistics, international (maritime-railway) multimodal transport, and container sharing. In recent years, CRIMT, clinging on the Belt and Road Initiative, has endeavored to develop the international multimodal transport market. In 2016, CRIMT operated 1702 China-Europe cargo trains hauling 140,000 TEUs, and 646 China-Asia cargo trains hauling 66,000 TEUs. It finalized 23,000 TEUs of bulk container loads of international multimodal transport, rising by 18% YOY (Li 2017).

In March 2016, China International Maritime Container Co. Inc. (CIMC), the world-leading supplier of logistics equipment, established CIMC Multimodal Transport Co., Ltd. to expand its multimodal transport business and build its highway-railway multimodal transport logistics network platform.

SINOTRANS-CSC is China's largest agency of international freight air cargo and international express mail. It is also the sole Ro/Ro logistics operator of vehicles that can handle river, sea and ocean multimodal transport in China. At present, the company owns and controls 190 container ships with a total capacity over 82,000 TEUs. The company's multimodal service network spreads along the Yangtze River, the coastal regions in China, the Northeastern Asia, and the Pan-Pacific Region.

7.3.5 Multimodal Transport Demonstration Projects Propagated Rapidly

In recent years, China has actively promoted the multimodal transport demonstration projects. In July 2015, the Ministry of Transport and the NDRC jointly issued the *Notification about Conducting Multimodal Transport Demonstration Projects*, which kicked off the multimodal transport demonstration projects. In June 2016, the first batch of 16 such projects was approved. Details are listed in Table 7.2.

Propelled by the Government's policies, various demonstration projects have developed rapidly. As of March 2017, 39 multimodal transport routes have been opened through the 16 multimodal transport demonstration projects, which finalized more than 600,000 TEUs of container multimodal transport, with an average cost 35% lower than that of highway transport. In total, these shipments reduced about 660 thousand tons of equivalent coals and 1.7 million tons of carbon emissions, thus evidencing an early comprehensive benefit from the multimodal transport.

7.3.6 Multimodal Transport IT Platforms Built Rapidly

As multimodal transport and Internet and information technology develop rapidly, public information platform of multimodal transport has become a major tool to promote multimodal transport in China. In recent years, local governments have worked vigorously to build multimodal transport public information platforms.

In 2011, Jiangsu became the first province to put into trial operation a railway-waterway multimodal transport public information service platform. To date, this information service platform has achieved data connection with the Port of Lianyungang, the Port of Xuzhou, and the Port of Nanjing. Among these, the Port of Lianyungang Railway-Waterway Multimodal Transport Information System covers 100% of the container freight agents that conduct railway business and more than 90% of the bulk cargo agents that conduct railway business.

In 2016, Liaoning Province hastened its construction of Shenyang-Harbin Hongyun multimodal transport full-process information sharing service demonstration platform; the platform mainly employs the multimodal transport information representation and exchange technologies of international container cross-border

Table 7.2 First batch of 16 multimodal transport demonstration projects

Demonstration project	Spearheading enterprise(s)	Partner enterprise(s)
Piggyback transport (highway-railway multimodal transport)	CRSCS	Beijing Tuofeng High Tech Co., Ltd., CRRC Qiqihar Rolling Stock Co., Ltd., and China Post Group Corporation
“Eastern Coastal Region, Beijing-Tianjin-Hebei, and Northwestern Region” channel container railway-maritime-highway multimodal transport in Hebei Province	Tangshan Port Group Co., Ltd.	Tangshan Port International Container Terminal Co., Ltd. and Shanghai Hede International Logistics Co., Ltd.
Dalian Northeastern Asia International Shipping Center’s “Asia-Pacific and Northeastern Region” channel container railway-highway-maritime multimodal transport	Dalian Port Container Development Co., Ltd.	Dalian Tiejue Group Co., Ltd.
“Southeastern Coastal Region-Yingkou-Europe” channel container highway-railway- waterway multimodal transport in Liaoning Province	Yingkou Port Group Corporation and Liaoning Shenha Hongyun Logistics Co., Ltd.	Shenyang Railway Bureau, Harbin Railway Bureau, and Liaoning Hongyun Logistics (Group) Co., Ltd.
New Eurasia Continental Bridge container multimodal transport demonstration project in Jiangsu Province	Port of Lianyungang Holding Group Co., Ltd.	Shanghai Railway Bureau
“Ningbo Zhoushan Port and Zhejiang-Jiangxi-Hunan (Chongqing-Sichuan)” container maritime-railway-highway multimodal transport	Ningbo Port Co., Ltd.	Shanghai Railway Bureau, SINOTRANS Zhejiang Co., Ltd., COSCO Shipping Lines Co., Ltd, China Shipping Container Lines Co., Ltd. (CSCL) and CR International Co., Ltd.
Qingdao “Belt and Road” cross-border container maritime-railway-highway multimodal transport	Port of Qingdao (Group) Co., Ltd., and CRInternational (Qingdao) Co., Ltd.	SINOTRANS Shandong Co., Ltd. and Shandong Land Bridge International Freight Agent Co., Ltd.
Zhengzhou-Europe international cargo train “One Trunk and Three Branches” railway-maritime-highway multimodal transport in Henan Province	Zhengzhou International Hub Development and Construction Co., Ltd.	None

(continued)

Table 7.2 (continued)

Demonstration project	Spearheading enterprise(s)	Partner enterprise(s)
The Wuhan City's "Belt and Road Initiative and Yangtze River Economic Belt strategy" container railway-waterway multimodal transport demonstration project in Hubei Province	Wuhan Port and Shipping Development Group Co., Ltd.	Wuhan Railway Bureau
SINOTRANS (Guangdong) "ASEAN-Guangdong-Europe" highway-highway-maritime-river multimodal transport	SINOTRANS Guangdong, Co. Inc., SINOTRANS Dongguang Logistics Co., Ltd.	None
Highway-railway multimodal transport cold-chain logistics channel that runs through Eurasia Continent	China Railway Tielong Container Logistics Co., Ltd.	Nanning Zhenyang Logistics Co., Ltd. and Nanning Railway Bureau
Chongqing-Singapore-Europe multimodal transport	Chongqing Transport Holding (Group) Co., Ltd.	None
Chengdu international railway port container railway-highway-waterway multimodal transport demonstration project in Sichuan	Chengdu Inland Port Operations Co., Ltd.	International Container Terminal of Luzhou Port
"Kunming-SE Asia, Yangtze River Economic Belt, Guangxi Beibu Bay" One Hub-Three Branch container railway-highway-maritime multimodal transport in Yunnan	Yunnan Tengjin Logistics Co., Ltd.	None
Lanzhou South Asia International cargo train highway-railway multimodal transport	Lanzhou International Port Area Investment and Development Co., Ltd.	Kaida International Freight Service Co., Ltd. and Lanzhou Jinlun Industry Co., Ltd.
Xinjiang Production and Construction Corps Silk Road International Multimodal Transport demonstration project	Xinjiang Lianyu Investment Co., Ltd.	Xinjiang Sino-Europe Logistics Co., Ltd., Shandong Linyi-Singapore-Europe International Logistics Co., Ltd., and Henan Link Global International Logistics Co., Ltd.

trains and domestic trade container railway-maritime multimodal transport to achieve systematic and holistic logistics supply chain service, featuring cross-system and real-time linking capability.

In December 2016, the Yangtze River Economic Belt multimodal transport public information and trading platform was put online in Nanjing as China's first "Internet+" multimodal transport information and trading platform. This platform provides services such as online payment, billing, freight insurance, and dynamic and video inquiry of freight status, which can attain real-time coordination and seamless connection between goods and transport vehicles.

In addition, Henan, Guangdong, Sichuan, Fujian and Hunan provinces are also speeding up their efforts in building multimodal transport service platforms so as to push forward efficient sharing of information among railway, highway, waterway, air and postal service.

7.3.7 Technical Level of Rapid Transit Equipment for Multimodal Transport Keeps Improving

In recent years, China has been promoting the application of multimodal transport rapid transit equipment and technologies, while speeding up the seamless linking between loading/unloading equipment and transit equipment. At the same time, it has made ample use of RFID, IoT and other advanced information technologies to build the intelligent transit system and improve the automation and efficiency of multimodal transport transit.

For example, CRRC Qiqihar Rolling Stock Co., Ltd. and Beijing Tuofeng High Tech Co., Ltd. jointly developed the prototype of new-generation multimodal transport, piggyback transport (QT1 and QT2). The QT1 piggyback vehicles are used for whole- or semi-trailer transport on highways; the QT2 piggyback vehicles are used for highway semi-trailer drop-and-pull transportation. These equipments can meet the automatic attaching/detaching requirements of piggyback vehicles for highway whole- and semi-trailers, thus meeting the transport demands for railways to consummate the long- and medium-distance transport and door-to-door service.

To meet the needs for container highway-railway-waterway multimodal transport of rolled plates, circular disc steels, coal and ores, the Port of Yingkou in Liaoning Province has developed the 40.5-foot-tall special boxes, which can be transported in double-layer piles on railways and in single-layer pile on highways, while adhering to the efficiency and safety requirements.

Chengdu International Railway Port employs the new technology of NBX refrigeration vehicle to develop the maritime-railway multimodal transport for refrigerated containers, which ensures the imported frozen meat from Uruguay reaching China at the Ningbo Port and being transported directly to Chengdu on railways; the logistics cost of this multimodal transport is 30% lower than that of highway transport. Meanwhile, Chengdu International Railway Port has also developed the technology

of double-deck containers for vehicles to solve the problem of shipping cars out of Chengdu region via railway-highway multimodal transport.

Xinjiang Lianyu Investment Co., Ltd. has developed the new-type of rapid loading/unloading and transit technology for pallets, which is applied in loading and transporting the sylvine products, thus reducing the large amount of labor cost and shortening the time of loading/unloading goods. Besides, Qingdao, Ningbo and Nanchong are also upgrading the technical level of their rapid transit equipment to cater to the fast-paced growth of multimodal transport.

7.4 Problems and Trend of Multimodal Transport in China

Though China has made discernable progress in multimodal transport in recent years, there still exist many problems in terms of poor coordination between facilities and equipment, shortage of multimodal transport enterprises, insufficient integrated service quality and comprehensive service capability, and inadequate development environment. For the future, as the multimodal transport development environment improves, international multimodal transport will grow rapidly and multimodal transport hubs will be built more readily. At the same time, the multimodal transport service products will be enriched and the standardization system will be enhanced.

7.4.1 Problems in China's Multimodal Transport

7.4.1.1 Poor Coordination Between Facilities and Equipment

For years, port hubs, railway hubs, railway container hub stations and handling stations are administered by different departments, making it difficult to execute unified planning and management; insufficient coordination directly impinge on the efficient connection between various transportation means. For example, restricted by management institution and transport capacity, many container ports are not directly connected to railways. The conspicuous phenomenon of “ports separated from stations” results in low proportion of railway-maritime multimodal transport. At present, railway-maritime multimodal transport in China only accounts for 2% of the processing quantity of port containers, which is far below the 10–30% proportion in Europe and the US. Besides, freight hubs capable of multimodal transport in China are relatively few, special depots, carrying vehicles and connection/transit facilities are small in scale, standardized and applications of advanced transit technologies are lagging behind; these factors directly impact on the efficient coordination and connection among facilities.

7.4.1.2 Multimodal Transport Enterprises Are Few

According to statistics of the Ministry of Commerce, in 2011, there were 27,000 registered international freight agent enterprises, and more than 100 thousand second- and third-tier agent enterprises indirectly engaged in international freight agency services. Nevertheless, there are not many domestic enterprises that have the capability to function as operators of international multimodal transport. Common difficulties include small corporate scale, disparate service functions, and relatively backward operating models. It is difficult for these enterprises to meet the requirements of multimodal transport in terms of transportation network, organization of whole-process transport chain, and integrated service.

7.4.1.3 Insufficient Integrated Service Quality and Comprehensive Service Capability

Compared with the connective and efficient model of organizing multimodal transport, multimodal transport in China is still in the initial stage of coordinative development, characterized by segmented transport, settlement, responsibility, and insurance. Coordination among sections of multimodal transport is not smooth enough; their comprehensive service capability is in need of improvement. For instance, most highway-railway multimodal transport still adopts the partnership approach between railway and highway carriers, with each carrying out segmented transport activity and taking segmented responsibility. The highway transport operators are responsible for organizing the goods, the “first-mile door-to-station” transport and the “last-mile station-to-door” transport; the railways are responsible for the “station-to-station” transport. It has not yet formed a wholly integrated multimodal transport.

7.4.1.4 Development Environment yet to Be Improved

Development environment in multimodal transport in China is yet to be improved in three aspects. First, the policies, laws and regulations are not suitable. Presently, China still does not have dedicated laws or regulations on multimodal transport. The existing multimodal transport policies among various administrative offices lack coordination; they tend to be overlapping and non-uniform. Second, the credibility level of multimodal transport market needs improvement. With credibility level of freight market being low, China must establish a sound credit appraisal system and a reward/penalty mechanism for multimodal transport operations. Third, standardized regulations are not yet unified. Though railways, waterways, highways and air transport in China have their own complete rules for transport services, China lacks clear and uniform multimodal transport service regulations. It is difficult to achieve an effective connection of goods among various transportation means.

7.4.2 *Trend in China's Multimodal Transport*

7.4.2.1 Multimodal Transport Will Gain Rapid Development

At present, demands for multimodal transport in China mainly come from developed economic regions in the Yangtze River Delta, the Pearl River Delta and the Circum-Bohai Sea Region. However, because the places of origin are mainly concentrated in coastal areas, multimodal transport does not have evident cost advantages in short-distance transport. As the Yangtze River Economic Belt and other national strategies are implemented in China, the regions opening-up to the world will extend into inland China, the manufacturing industry will also be transferred to the Central and Western Regions, and the hinterland of coastal ports will expand to the inland areas. The longer distance of transport will underscore the advantage of multimodal transport in organizing various transportation means. As a result, the market size of multimodal transport in China is expected to grow rapidly. Besides, as China establishes the holistic layout of opening-up steered by the Belt and Road Initiative, the railway connectivity and cross-border and trans-regional multimodal transport corridors will improve, and the international multimodal transport will develop more rapidly.

7.4.2.2 Multimodal Transport Hubs Will Be Built More Rapidly

The multimodal transport hubs, with better facilities for collection and distribution, improved information system, and efficient transit and loading/unloading equipment, will function as the carriers of efficient exchange among various transportation means and between the trunk lines and branch lines. They can effectively improve the efficiency and the level of connectivity among the hub nodes and the transportation routes in the channels. In the 13th Five-year Plan period, China's Government has clearly stipulated the tasks of optimizing the layout and planning of freight hubs, and accelerating building freight hubs that have multimodal transport functions and cross-border cluster and radiation.

7.4.2.3 Multimodal Transport Service Products Will Be Enriched

In the 13th Five-year Plan period, China's Government has committed to expand the professional multimodal transport markets of automobiles, refrigerated containers, and tank containers, while enriching the multimodal transport service products. Furthermore, 18 departments including the Ministry of Transport has also encouraged the logistics industry to speed up the cycling and sharing of standard pallets and transport packages to foster the leasing market of multimodal transport equipment for containers, semi-trailers and pallets, and to enrich the multimodal transport auxiliary service products.

7.4.2.4 Multimodal Transport Standard System Will Be Improved

Standardization is the foundation of efficient operations of multimodal transport, and the standardization of the carrying unit is the basis of all standardizations. At present, China has not yet established the carrying unit standardization system based on container and semi-trailer van. As a result, it is urgent to build the multimodal transport technical standard system with Chinese attributes based on standard carrying units. In the 13th Five-year Plan period, the Government has clearly dictated to establish the framework of technical standards for inland containers suitable to China's needs. At the same time, China will actively participate in the construction of international standards of multimodal transport, and further enhance its own multimodal transport standard system.

7.5 Summary

This chapter introduces the four aspects of current multimodal transport development in China, namely, the overview of multimodal transport, the development environment, the current development status, and the existing problems and development trend.

In terms of development environment, as China's economy enters into the New Normal phase, and the "Three National Strategies" are implemented, there is a huge potential demand for multimodal transport. At the same time, as China institutes further policies and measures on multimodal transport, the relevant service regulations and standards are improved, and the development environment of multimodal transport is also bettered.

In terms of the current development status, China keeps expanding the scale of multimodal transport and improving the relevant infrastructures, thus has preliminarily established multimodal transport channels which are efficiently connected. Meanwhile, multimodal transport enterprises keep expanding, and multimodal transport demonstration projects are also propagated rapidly. Besides, China has accelerated the pace of constructing multimodal transport information platforms, and steadily upgraded its rapid transit equipment and technologies. In terms of existing problems and development trend, multimodal transport in China is confronted with problems such as poor coordination between facilities and equipment, shortage of multimodal transport operators, insufficient integrated service quality and comprehensive service capability, and inadequate development environment. As its development environment being improved, multimodal transport will gain rapid growth and its service products will be enriched. Furthermore, China will speed up its construction of multimodal transport hubs and improve its standardization system of multimodal transport.

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Chapter 8

Capital Operations in China's Logistics Industry



Yong Liu

An enterprise's ability in capital operations is closely related to its ability of garnering funds and resources, and bears directly upon its capacity in expansion and growth. At present, logistics industry in China is going through transformation and upgrading, hence capital operations have become an essential means for its enterprises to improve their competitiveness. More and more logistics enterprises choose to rapidly expand the operational scale, enlarge the market space, and realize the business transformation through capital operations.

This chapter contains three sections. Section 8.1 sums up the current situation and the characteristics of capital operations in China's logistics enterprises. Section 8.2 analyzes the role of capital operations in the logistics industry in China. Section 8.3 suggests an outlook regarding the trend of capital operations in China's logistics industry.

8.1 Current Situation and Characteristics of China's Logistics Industry

Capital operations refer to operational activities that use capital market to realize capital appreciation by financing the corporate incremental resources and adjusting the reserve resources. Ways of capital operations mainly include financing in capital market, corporate merger and acquisition, spin-off, and regrouping. (Ding et al. 2013). In recent years, as demand in logistics market expands in China, new business models keep emerging. Private capitals are boosting up the investment intensity in logistics industry. To enhance corporate competitiveness, logistics enterprises are strengthening their capital operations, and accelerating the pace of advancement through capital operations.

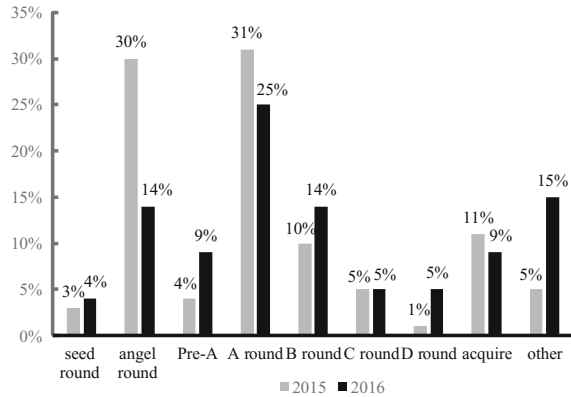
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Fig. 8.1 Financing rounds of logistics enterprises in 2015 and 2016. *Source* LogClub, 155+ financing cases in logistics industry in 2016, <http://www.ebrun.com/20170112/210683.shtml>



8.1.1 Financing Quantity of Logistics Industry Kept Rising

Since 2006, logistics industry in China has seen a steady rise both in the number of enterprises gaining private equity/venture capital (PE/VC), and in the amount of investment. In 2015 alone, more than 160 financing cases consummated in the logistics industry, with the number of financed logistics enterprises reaching a peak over the past decade. In 2016, there were 155 financing cases in the logistics industry, a number which is slightly lower than that in 2015 (LogClub 2017).

In 2015 and 2016, there were many cases of angel round, A round and B round financing for logistics enterprises.¹ In 2015, the A round and pre-A round financing took 68% of the total. In 2016, the A round and pre-A round financing took 52% of the total, or 16% points lower than that in 2015. This indicates that in recent years the investors tend to prefer logistics enterprises which have explicit investment model and show growth (Fig 8.1).

¹Instead of rigorous definition, the classification of financing rounds is conventional. The general sequence is: seed round → angel round → A round (Round 1) → B round (Round 2) → C round (Round 3). It is believed that, in the seed round and angel round, the company only has product concept without specific products or even a team; The A-round companies are featured by product prototypes, which are in the trial operations stage, without or with little incomes; The B round companies are relatively mature, which have clear business model and some profits; The C round companies are mature, which have considerable profits and customer base. Some companies have pre-A round financing. Compared with the angel round companies, pre-A round companies have established teams. But this classification is not absolute. Some companies, in the phase of A-round financing, might already have tangible scale of business. In general, for the same company, the investors have higher requirements for business scale and profitability in later rounds of financing.

8.1.2 Logistics Internet Platforms Becoming New Investment Targets

As mobile Internet develops robustly and new technologies such as cloud computing, IoT and big data becoming mature, O2O logistics platform companies are emerging, and ushering in the development of new logistics models. The new logistics models, relying on physical shops, ensure the “Last Mile” logistics coverage in cities and will eventually support the “One- Kilometer Life Circle.”

O2O logistics platform enterprises have gained favor of the investors ever since 2014. Preliminary statistics show that in 2015 alone, more than thirty O2O logistics enterprises, such as EasyVan and Linjia, received financing (Transport Logistics China 2016); O2O had become the most robust financing field in logistics industry. In 2016, logistics O2O continued to be favored by the investors, becoming the popular investment target. Table 8.1 shows the major financing cases in the logistics O2O field in 2016.

In the wave of “Internet + traditional industries,” intra-city service and “Last Mile” delivery have been well-recognized and favored by private investors. Table 8.2 lists the major financing cases in intra-city service and the Last Mile delivery fields in 2016.

8.1.3 Logistics Enterprises Being Listed in Stock Market

The scale and scope of logistics enterprises garnering funds through stock market have significantly expanded. In 2016, there were 25 cases of IPO or private placement by logistics enterprises in the capital market, much higher than the 13 cases in 2015; the total sum of funding was more than 110 billion RMB. YTO, by making private placement, received the largest sum of funding of 17.5 billion RMB. Table 8.3 shows a list of logistics enterprises which issued stocks and obtained funding in 2016.

Small and medium-sized logistics enterprises are active to be listed in the National Equities Exchange and Quotations (NEEQ). In June 2013, the State Council of China expanded the NEEQ pilot test to the entire country, encouraging innovative and startup SMEs to seek financing. Since 2014, it has become a trend for small and medium-sized logistics enterprises to be listed in the NEEQ, with the number of such companies rising year by year, from 11 at yearend of 2014 to 50 at yearend of 2015, to 134 at yearend of 2016. Also, enterprises listed in the NEEQ are engaging in more diverse fields of logistics, ranging from the singular logistics transportation to multiple services in warehousing, road transportation, waterway transportation, loading/unloading and movement, software and IT service, and supply chain service. A number of innovative enterprises such as DLD Logistics, AirFex, E6, and An Jie Supply Chain have been listed in the NEEQ.

Table 8.1 Major financing cases in the logistics O2O field in 2016

Platform	Positioning	Financing time	Round	Amount	Investor
Delivery Artifact	Home intelligent logistics platform	January	Seed round	–	Chengdu Zhongyigaotou Investment Funds Management Co., Ltd. and SVC Venture Club
Fuyoukache	Long-distance vehicle logistics O2O service provider	April	B round	100 million USD	Eastern Bell Venture Capital leads
Huochebang	Freight O2O platform	April	A++ round	35 million USD	Genesis Capital leads; Tencent and DCM, etc. follow
Huolala	Freight O2O platform	May	C round	10 million USD	Mindworks Ventures leads; Crystal Stream Capital, App Works, and Asia Plus follow
Babasuper	Freight logistics information platform	May	Pre-A round	30 million RMB	Launcher Capital
Shabro	Internet+ freight logistics	June	Pre-A round	8 million RMB	Qianhai Meng Fund
Gogovan	Intra-city freight service and logistics platform	May	C round	–	New Horizon dominates; Alibaba's Hong Kong Entrepreneurs Fund, Singapore Press Holding, Hotung Investment Holdings Ltd., and previous investors follow
Chemmanman	Freight logistics management system	November	B round	77.50 million RMB	Transfer Logistics
Yunmanman Logistics	Intelligent cargo allocation platform	December	D1 round	110 million USD	Unavailable
KXTX	Less-than-truckload transportation trading network platform	December	D round	–	Grand Flight Investment leads; Far East Horizon, Greenwoods Investment, GX Capital, and Gfund follow
Huochebang	Freight O2O platform	December	B1 round	115 million USD	International Finance Corporation and All-Stars Investment lead; Tencent, Genesis Capital, and DCM Ventures follow

Table 8.2 Major financing cases for intra-city service and Last Mile delivery in China in 2016

Company	Positioning	Financing time	Round	Amount	Investor
Yunniao Technology Co., Ltd	Supply chain delivery service provider	January	C round	100 million USD	Warburg Pincus leads; Sequoia Capital China, Matrix Partners China, and Jinsha Capital follow
Mashangsongcan	Intra-city delivery service O2O	April	Angel round	Millions of RMB	Shenzhen Zhongyuan Equity Investment Fund Management Co., Ltd
Renren Express	C2C crowd-sourcing logistics	April	B round	50 million USD	A famous firm making middle- and late-stage investments
Zhaixiaozhu	On-campus delivery platform	June	Pre-A round	10 millionRMB	JZDD
Diyi Box	Intelligent express service platform	June	Pre-A round	tens of millions of RMB	Bang Ming Capital
HuHu	Internet logistics delivery platform	July	Pre-A round	5 million RMB	Shenzhen Chamagudao Investment Co., Ltd
Dianwoda	Real-time crowd-sourcing logistics platform	July	D round	1 billion RMB	Alibaba and other VCs follow
Imdada	Last Mile home delivery	October	N/A	50 million USD	Walmart

Table 8.3 Logistics enterprises issuing stocks and receiving funding in 2016

Company	Listed in	Time	Ways of issuing	Financing amount
Beijing Airport Hightech Park Co., Ltd.	Main board in Shanghai Stock Exchange	2016.1	Private placement	600 million RMB
COSCO Shipping Specialized Carriers Co., Ltd.	Main board in Shanghai Stock Exchange	2016.2	Private placement	2.5 billion RMB
Xinjiang Tianshun SCM Co., Ltd.	Shenzhen SME Board	2016.5	IPO	140 million RMB
Anhui Wanjiang Logistics (Group) Co., Ltd	Main board in Shanghai Stock Exchange	2016.4	Private placement	3.03 billion RMB
CTS freight Co., Ltd.	Main board in Shanghai Stock Exchange	2016.4	Private placement	600 million RMB
Nantong Square Cold Chain Equipment Co., Ltd	Main board in Shanghai Stock Exchange	2016.5	IPO	527 million RMB
Juneyao Airlines Co., Ltd.	Main board in Shanghai Stock Exchange	2016.5	Private placement	3.36 billion RMB
China Logistics Property Holdings Co., Ltd.	Main Board in HK Stock Exchange	2016.7	IPO	3.37 billion HKD
Guangdong provincial Expressway Development Co., Ltd.	Shenzhen SME Board	2016.7	Private placement	2.47 billion RMB
China Eastern Airlines Co., Ltd.	Main board in Shanghai Stock Exchange	2016.7	Private placement	8.55 billion RMB
Haiqi Transportation Group Co., Ltd.	Main board in Shanghai Stock Exchange	2016.7	IPO	302 million RMB
Ningbo Zhoushan Port Co., Ltd.	Main board in Shanghai Stock Exchange	2016.8	Private placement	3.01 billion RMB
China Harzone Industry Co., Ltd	Shenzhen GEM	2016.8	IPO	768 million RMB

(continued)

Table 8.3 (continued)

Company	Listed in	Time	Ways of issuing	Financing amount
Changjiu Logistics Co., Ltd.	Main board in Shanghai Stock Exchange	2016.8	IPO	620 million RMB
New Trend International Co., Ltd.	Shenzhen GEM	2016.8	IPO	340 million RMB
Hainan Airlines Co., Ltd.	Main board in Shanghai Stock Exchange	2016.9	Private placement	16.5 billion RMB
Janco Global Logistics Co., Ltd.	Hong Kong GEM	2016.10	IPO	60 million HKD
YTO Express	Main board in Shanghai Stock Exchange	2016.10	Private placement	17.5 billion RMB
ZTO Express	New York Stock Exchange	2016.10	IPO	1.4 billion USD
Shanghai Jiaoyun Group Co., Ltd.	Main board in Shanghai Stock Exchange	2016.11	Private placement	1.43 billion RMB
Delixi Xinjiang Transportation Co., Ltd.	Main board in Shanghai Stock Exchange	2016.12	IPO	193 million RMB
Guanghui Logistics Co., Ltd.	Main board in Shanghai Stock Exchange	2016.12	Private placement	4.16 billion RMB
STO Express	Shenzhen SME Board	2016.12	Private placement	14.9 billion RMB
Yunda Express	Shenzhen SME Board	2016.12	Private placement	17.09 billion RMB
Tangshan Port Group Co., Ltd.	Main board in Shanghai Stock Exchange	2016.12	Private placement	1.20 billion RMB

8.1.4 Express Delivery Industry Seeking Capital Support

Confronted with fiercer competition and sliding gross margins in the industry, express delivery enterprises urgently need the help of external capital so as to accelerate their transformation towards comprehensive logistics service providers. In October 2015, the State Council of China issued *A Few Opinions of the State Council about Facilitating the Development of Express Delivery Industry* (State Council document [2015] 61), supporting the express delivery enterprises to get financing through merger and

Table 8.4 IPO of Top 5 express delivery enterprises

Company	Time and means of initiating IPO	Time of getting listed
S.F. Holding Co., Ltd.	In 2015, S.F. Holding started the back-door IPO process via Maanshan Dingtai Rare Earth and New Materials Co., Ltd. in A-share market	Listed in Shenzhen Stock Exchange on February 24, 2017
STO Express	In 2015, STO Express initiated the back-door listing via Zhejiang IDC Fluid Control Co., Ltd. in A-share market	Listed in Shenzhen Stock Exchange on December 30, 2016
YTO Express	In 2015, YTO Express initiated back-door listing in A-share market via DayangTrands Co., Ltd.	Listed in Shanghai Stock Exchange in October 2016
ZTO Express	In June 2015, ZTO Express obtained investments from Warburg Pincus, Hillhouse Capital, Standard Chartered Venture Group, and Sequoia Capital China to initiate the IPO in overseas market	On October 27, 2016, ZTO Express was listed in the New York Stock Exchange
Yunda Express	In July 2016, Yunda Express initiated the back-door IPO in A-share market via Ningbo Xinhai Electric Co., Ltd.	On January 18, 2017, it was listed in Shenzhen Stock Exchange

acquisition, regrouping, and IPO. Encouraged by this policy, large express delivery enterprises began to enter the IPO process. In October 2016, YTO made the back-door listing in Shanghai Stock Exchange via DayangTrands Co., Ltd. In December 2016, STO made the back-door listing in Shenzhen Stock Exchange via Zhejiang IDC Fluid Control Co., Ltd. In January 2017, Yunda Express made the back-door listing in Shenzhen Stock Exchange via Ningbo Xinhai Electric Co., Ltd. In February 2017, SF Holding made the back-door listing in A-share market via Maanshan Dingtai Rare Earth and New Materials Co., Ltd. In addition, ZTO Express was listed in the New York Stock Exchange, thus became China's first express delivery service provider listed in the US. Table 8.4 shows the IPO of Top 5 express delivery enterprises.

Other express delivery enterprises also augmented financing to expand investments in their operating networks (such as outlets, depots, trunk and branch vehicles, etc.), information systems, and intelligent transmission technologies. In June 2016, Sure Express received a new round of financing worth 3 billion RMB, as well as acquiring a 15 billion RMB credit extension. Table 8.5 shows the major financing cases of other express delivery enterprises in China in 2016.

Table 8.5 Major financing cases among other express delivery enterprises in 2016

Company	Time of financing	Round	Amount	Investors
TTK Express	February	A round	600 million RMB	CQB Fund leads; Guizhou Panjiang Investment Holding Group Co., Ltd, Qingdao Haier Venture, Zhejiang Click Asset Management Corporation Ltd., Zhejiang Chengxiang Investment and Ningbo Dahanghai Investment Co., Ltd. follow
Sure Express	June	Investment as shares + joint credit extension	3 billion RMB financing +15 billion RMB credit extension	China Merchants Capital, China Merchants Wealth, JD Capital, Qianhai Fund, Communicate Bank of China, PingAn Bank, and Agricultural Bank of China provide credit extension of 15 billion RMB
UC Express	June	A round	300+ million RMB	Eastern Bell Venture Capital, Kerry Logistics, and Fujian Toffen Capital co., Ltd.
Fast Express	June	B round	800–1000 million RMB	First round of investors include Shanghai Jingyi Investment Company; Shanghai Dexin Equity Investment and Shanghai Dashun VC Center continue to follow
BES Express)	September	–	760 million USD	Everbright Financial Holding Asset Management Co., Ltd. and CITIC Industry Investment lead; Alibaba follows via Cainiao Network Technology Co., Ltd.
Quanfeng Express	October	Strategic investment	1.25 billion RMB	CYTS Logistics

8.1.5 *Logistics Enterprises Making Active Merger and Acquisition Moves*

Domestic logistics enterprises are making more merger and acquisition moves with mounting capital values. Logistics industry in China is confronted with the transition pressure due to upgrading and transformation, along with fierce market competition. Leading logistics enterprises have integrated their resources and enhanced the competitiveness through merger and acquisition. Since 2012, logistics industry has seen continuous wave of merger and acquisition, which has become the industry's new driving force for growth. In 2013 and 2014, the logistics industry saw more than 110 cases of merger and acquisition in each year, with total capital value exceeding 4.2 billion USD (Deloitte Research 2016). From September 2015 to September 2016, 146 merger and acquisition cases consummated in the transportation, warehousing and post industry; of which 135 cases announced the amount of regrouping, with a total worth of 70.0 billion RMB (Liu 2016). Table 8.6 shows the major merger and acquisition cases in China's logistics industry in 2016.

Besides, logistics enterprises in China have markedly augmented the number and amount of international merger and acquisition cases. As the Belt and Road Initiative strategy is implemented, logistics enterprises in China have sped up the pace of "going abroad." Merger and acquisition has become one of the principal means of implementing the internationalization strategy. In 2013, there were only three merger and acquisition cases, worth 10 million USD; the number grew to 16 cases, worth 1.77 billion USD in 2014. In 2015, there were 11 international merger and acquisition cases, worth 1.61 billion USD (The Ministry of Commerce, National Bureau of Statistics, and State Administration of Foreign Exchange of the People's Republic of China). In 2016, China's enterprises were still active in merging and acquiring overseas logistics enterprises with considerably increased capital amount. The cross-border merger and acquisition cases in 2016 evidently focused on port enterprises speeding up their establishment of international network.

Table 8.6 Major merger and acquisition cases in China's logistics industry in 2016

Acquirer	Acquired	Amount
Zhejiang Transfer Co., Ltd	Transfer Logistics	20 billion RMB
China COSCO Shipping Co., Ltd.	COSCO Shipping	–
Zhejiang IDC Fluid Control Co., Ltd.	STO Express	16.9 billion RMB
Dayang Trands Co., Ltd.	YTO Express	17.5 billion RMB
Ningbo Xinhai Electric Co., Ltd	Yunda Express	18 billion RMB
Heilongjiang Heihua Co., Ltd.	Antong Logistics	0.64 billion RMB
Fujian Longzhou Transportation Co., Ltd.	Tianjin Zhaohua Pioneer Co., Ltd.	1.24 billion RMB

Power Construction Corporation of China built the Melaka Gateway in Malaysia and entrusted RiZhao Port to operate it. Upon completion, the Melaka Gateway will become the largest port in East Asia. After acquiring Port Darwin in Australia, the Landbridge Group acquired Margaret Island Port, the largest port in Panama, in May 2016. In August 2016, COSCO Shipping and Hellenic Republic Asset Development Fund (HRADF) signed the “MOU of Finalizing Trading of Majority Equity of Piraeus Port Bureau.” COSCO Shipping became the controlling shareholder of Piraeus Port Bureau, and would take over the operations of the Port. In October 2016, CIC Capital acquired 20% equity of the Melbourne Port. In December 2016, China Merchants Group spent 1.1 billion USD to acquire 80% equity of Hambantota Port in the south of Sri Lanka.

In addition to port enterprises, cross-border merger and acquisition cases also took place in other fields. In June 2016, Kerry Logistics acquired the majority equity of Apex Maritime and its associated companies. In December 2016, Tianhai Investment, the subsidiary of HNA Logistics, spent 6 billion USD to purchase Ingram Micro, the world's largest IT product distributor and supply chain service provider. In 2016, CMST Development Co., Ltd., by purchasing 51% equity of Henry Bath & Son Limited, entered the arena of overseas market of commodity futures delivery warehouse.

8.1.6 Domestic Port Enterprises Speeding up Regrouping

Due to the recent slowing down of business in shipping industry, performance of ports in China declined, resulting in fierce competition among ports. With the implementation of the Belt and Road Initiative and the SOE grouping, various regions in China, by establishing port asset management platforms, regrouped their ports to improve the overall effectiveness.

In August 2015, Zhejiang Province established the Zhejiang Seaport Group as the platform to integrate coastal ports in the province. To date, Zhejiang Province has finalized the integration of five coastal ports in Ningbo, Zhoushan, Jiaying, Taizhou and Wenzhou. In November 2016, Zhejiang Province integrated Yiwu Land Port with coastal ports, thus ensuring Yiwu Port sharing the convenience measures with coastal ports in Zhejiang in trade, logistics and Customs clearance.

In January 2016, the Transportation Department in Guangxi Zhuang Autonomous Region signed the *Framework Agreement of Reforming Coastal Port Administration* with Qin Zhou City, which stipulated that Beihai Port Bureau be merged into Beibu Gulf Port Bureau in Guangxi. This Agreement signifies that the three ports of Beibu Gulf Port in Guangxi Zhuang Autonomous Region are administered under the “unified” management model featuring “unified planning, unified construction, unified management, and unified operations.”

In December 2016, the Tianjin Port Group and the Tangshan Port Group co-established the Tianjin Tangshan International Container Terminal Co., Ltd., which will integrate the hardware and software resources of container transportation in

Tianjin and Tangshan ports, thus fostering the complementary advantages, positive interactions, and cooperative win-win outcomes of the two parties in port resources and container route development. The establishment of Tianjin Tangshan International Container Terminal Co., Ltd. implies that the intra-industry competition among container berths in Tangshan Port has been resolved, thus effectively boosting the synergetic development of container business in Tianjin and Tangshan ports.

8.2 Role of Capital Operations in Developing China's Logistics Industry

As a network-based industry, logistics possesses strong scale effect and network effect, so intra-industry integration is the major trend in logistics development. Capital operation is one of the effective ways for the logistics industry to expand the business and reduce the cost. Also, capital operation also helps improve the concentration of logistics industry, functioning as the major driving force for the development of the logistics industry.

8.2.1 Helping the Scale Expansion and Improving the Industry's Concentration

By means of merger and acquisition, logistics enterprises can rapidly move up in business scale, thus reaping the advantages of scaled, networked, intensive and internationalized operations.

The development history of large logistics enterprises in the world clearly demonstrated that their expansion has been closely related to capital operations. For example, FedEx purchased many related companies in the US around 1977, thus growing into a logistics group with all-encompassing business capability. In 1999, 2000 and 2002, more than 300 merger and acquisition or alliance cases of different sizes had occurred in transportation and logistics market in the EU. Deutsche Post, DHL Express, K&N and TPG were major acquirers during those periods.

To enhance the scale operation of maritime shipping, in January 2016, the State Council of China approved the regrouping of COSCO Group and China Shipping Group into China COSCO Shipping Group. The resulted China COSCO Shipping Group accounts for 8% of total maritime shipping capacity in the world, ranking No. 2 in container shipping scale, No. 1 in oil fleet transport capacity, No. 2 in VLCC and No. 3 in container leasing business. Furthermore, it has become the world's second largest berth operator. Before regrouping, the two prior enterprises had no scale advantage, had serious homogeneity in their business resources, thus lacking competitiveness in both domestic and international segmented market. The newly-established group is evidently enhanced in scale advantage, market expansion capa-

bility, global layout and international competitiveness, which considerably improve its power of say-so in international shipping market, particularly in the container shipping market.

From the perspective of industrial development, active capital operations can help facilitate resource integration in the industry, notably improve the concentration of the industry, thus alleviating problems such as scattered logistics resources, small business scale, low professional level, and excessive competition.

8.2.2 Bolstering Investment in Upgrading Equipment and R&D, Thus Improving the Technical Level

Through capital operations, logistics enterprises can acquire large sum of funds for upgrading equipment, building R&D centers and attracting high-level human resource. These effects not only help improve the capability of logistics enterprises in independent R&D and production technologies, but also effectively enhance the technical level of the logistics industry.

The IPOs of China's Top 5 express delivery enterprises have acquired funding support for the express delivery industry to speed up its technical transformation and upgrading. Express delivery enterprises spend the gathered funds mainly in updating their hardware and software technical facilities for business operations. YTO Express, upon fund-raising, spent 1.1 billion RMB on building the transit center and updating the intelligent equipment, 600 million RMB on improving the transportation capacity of its network, and 600 million RMB on building its integrated intelligent logistics information platform. SF Express, having obtained funding, spent 1.11 billion RMB on building its information service platform and developing next-generation logistics information technologies, and 3.48 billion RMB on building the transit depots. By increasing investments in automated equipment for transiting and sorting, express delivery enterprises can markedly improve their processing capacity and upgrade their operational efficiency. Expending investments in upgrading the information system will lay a foundation for optimizing big data-based operations and value-added services for express delivery enterprises.

In 2015, through private placement, Jiangsu Xinning Modern Logistics Co., Ltd. acquired ETRANS and spent 20 million RMB in building ETRANS R&D Center. ETRANS has grasped the core technologies of using powerful Beidou and GPS systems on positioning algorithm, GNSS terminal and system platform, GIS, telecom technologies and data mining. Meanwhile, ETRANS has strong technical reserves in Beidou's accuracy-intensified positioning, multi-modular combination navigation, sensor and other professional technologies. The 20 million RMB investments in ETRANS R&D Center is mainly used to bring in technical talents, advanced equipment, software and hardware facilities, and supporting projects to the R&D Center. The investment will help enhance ETRANS's R&D capability in satellite positioning, and upgrade its integrated service capability along the industrial chain

of “navigation positioning algorithm—terminal products—system platform and app software—operating service—and industrial solutions.”

8.2.3 Improving Logistics Network Layout and Upgrading Service Quality

Logistics being a network-intensive industry, the breadth and depth of logistics networks, to a large extent, determines the capability of logistics enterprises in providing services.

To improve their network layout in domestic market, some logistics enterprises often acquire smaller enterprises, such as those regional logistics enterprises or those providing singular service. By so doing, they can not only effectively use the acquired enterprises' existing network and client resources, and reduce the cost of developing own local markets, but also enhance their strength in serving certain types of businesses.

From the end of 2014 till 2015, Rufengda Express acquired four COD companies, namely, Chuangyi in Hunan Province, Haihong in Shandong Province, Jianhua in Hebei Province, and Feiyuan in Shaanxi Province. These acquisitions laid the foundation for Rufengda to expand its network in Central China, Northwest China and Northern China. Through these merger and acquisition, the COD business of Rufengda Express expanded to Hunan, Shandong, Hebei, Shaanxi, Gansu, Ningxia and Qinghai provinces, thus improving its overall service capability. In December 2016, CJ-Rokin Logistics Co., Ltd. acquired Guangzhou Jianzhong Transportation Co., Ltd., thus expanded and improved its logistics operations network for hazardous chemicals. After the merger and acquisition, CJ-Rokin Logistics Co., Ltd. has established regulated and standardized operating outlets of hazardous chemicals in large and medium-sized cities in Northern China, Eastern China, and Southern China; its regional advantage is further highlighted.

Some large logistics enterprises, when entering the international markets anew, would often partner with local enterprises or purchase local enterprises in foreign countries to reduce the access barriers and attain larger market shares.

The chief tactic for China's express delivery enterprises in “going abroad” is to build overseas marketing outlets via overseas agents or to establish partnership agreements. For instance, SINOTRANS Co., Ltd., by establishing alliance with international strategic partners, has built the network of overseas agencies; presently it has established 75 overseas agencies (Li 2016). Some express delivery enterprises adopt the means of acquiring local enterprises. For instance, STO Express Inc., in 2013, acquired the entire shares of USG Express. Kerry Logistics, by purchasing Apex Maritime in USA, thus strengthened the coverage of its global sales network and enhanced its capability in international services.

8.2.4 Extending the Industrial Chain and Developing New Business

Viewed from a vertical perspective, logistics enterprises can foster new business and extend business chain by acquiring or merging with enterprises which afford related services.

In March 2017, Hainan Strait Shipping Co., Ltd. acquired 100% equity of Hainan Port & Shipping Xinhai Berth Co., Ltd., held by Hainan Harbor & Shipping Holding Co., Ltd. Through the acquisition move, Hainan Strait Co., Ltd. will engage in the Ro-Ro passenger ship's port business on the southern bank of Qiongzhou Strait, thus achieving integrated port and shipping operations. In August 2016, ELANE acquired 8.5% equity of KINGTECH Software Development Inc. and holds 100% shares of KINGTECH Software. It will apply the existing financial service and innovative insurance service to the container highway transport, thus improving its synergetic capability of vehicles, ships and cargos.

From a Horizontal perspective, capital operations help logistics enterprises gain access to new business fields, thus realizing their diversity strategy. For example, after S.F. Holding Co., Ltd. made the back-door IPO, it has leveraged the support from the capital market to develop the financial service business group, the commercial business group, the supply chain business group, the express delivery business group, and the warehousing/distribution logistics business group, each having launched its innovative products. By expanding the categories of service products, S.F. has gradually evolved from an express delivery enterprise into a comprehensive provider of logistics services.

8.3 Outlook on Capital Operations in China's Logistics Industry

As China's economy enters into the crucial period of transformation, its logistics industry has been elevated among all key industries due to its strategic importance and abundant strategic opportunities. However, the growth of logistics industry, in general, is slowing down and entering the new stage of transformation and upgrading; the development of logistics industry is also confronted with severe challenges. In the future, capital operations in logistics industry in China will exhibit new characteristics; the high-growth fields such as intelligent logistics will become new investment targets. Merger and acquisition moves in high-growth fields such as express delivery logistics, cold-chain logistics will continue to be active. The trend of cross-border logistics investments and merger and acquisition will remain for some time to come. However, IPOs of logistics enterprises, being constrained by many factors, will face stern challenges in the future.

8.3.1 Intelligent Logistics and Other High-Growth Fields Will Become Favored Investment Targets

Growth has always been the core emphasis of capital investment. From the perspective of industry, only industries with growth potential can become the favored investment targets; and the fields with long-term boom in the industry can become the favored object of investments. Nowadays when China's economy is in the crucial stage of transformation and upgrading, one of the major tasks is to ensure the transformation and upgrading of logistics means. It is anticipated that the logistics industry will maintain an unabated momentum in the long run.

Growth potential of the logistics industry will ensure it to remain attractive for private investments in the future. The following fields will probably become the favored investment targets in the logistics industry.

(1) The field of intelligent logistics. In 2016, the market size of intelligent logistics in China exceeded 200 billion RMB. It is expected that by 2025, the market size of intelligent logistics will exceed one trillion RMB (China Federation of Logistics & Purchasing (CFLP) and JD Logistics 2017). Intelligent logistics will embrace long period of strategic opportunities and the entire field is expected to grow by 30–50% per year. In the future, the system integration of intelligent manufacturing and intelligent logistics, intelligent logistics equipment and intelligent logistics warehousing will conceivably become the favored investment targets.

(2) The field of e-commerce. According to the *13th Five-year Plan of Express Delivery Industry*, express delivery industry, in 2016–2020, will anticipate an annual growth rate approaching 20%, reaching 800 billion RMB by 2020. As a result, in the upcoming period, e-commerce logistics typified by express delivery will maintain a rapid growth. E-commerce has entered into the era of competition based on efficiency of logistics supply chain; this will lead to higher requirements for e-commerce warehousing, intra-city delivery, and local terminal services. In the future, e-commerce warehousing, intra-city delivery, cross-border e-commerce logistics, local terminal services and other related logistics fields may very well become favored investment targets.

(3) The field of logistics Internet platform. The extensive application of mobile Internet, the rise of big data and cloud computing have provided technical support for remedying the small-sized, scattered, disorderly, and inferior traditional highway freight logistics. Business models of logistics platforms are also evolving, shifting from the online model to the O2O model, featuring linked online and offline operations. Some logistics platforms have established their own logistics parks. Presently, most of the platform enterprises are in the start-up stage, needing support from venture capitals so as to establish their unique competitiveness amid the fierce competition. In the future, the field of logistics O2O platform will continue to be attractive for private investors.

8.3.2 Merger and Acquisition in Express Delivery Logistics, Cold-Chain Logistics Will Remain Active

Merger and acquisition in express delivery industry will be accelerated in the future era. At present, there are more than 8000 express delivery enterprises in China. Compared with the overseas express delivery markets, the degree of concentration of express delivery market in China is still quite low. The Top Five express delivery enterprises listed in the stock market garnered more than 24 billion RMB on the first IPO, instilling enormous dynamism into the transformation and upgrading of the industry. Furthermore, more express delivery enterprises are expected to initiate their IPO in 2017. Bolstered by the capital platform, these express delivery enterprises will possess strong advantages in capital and scale, thus becoming the dominant force which pursue merger and acquisition moves in the industry.

Merger and acquisition moves will also be accelerated in cold-chain logistics. As fresh goods e-commerce develops swiftly and frozen food consumption keeps rising, cold-chain logistics in China will prosper briskly. It is estimated that the market size of cold-chain logistics will expand from 150 billion RMB in 2015 to 400 billion RMB in 2020. At present, the cold-chain logistics industry is exhibiting a notable trend of merger and acquisition. For instance, "Fresh Life Style" Supply Chain Management Co., Ltd. of the New Hope Group acquired more than 20 small and medium-sized cold chain logistics enterprises within one year. HNA Cold Chain Holdings Co., Ltd. also proposed to transform from an operator to an integrator of cold-chain resources. S.F. Holding Co., Ltd. also focuses on the development of cold-chain logistics. As powerful enterprises get into and emphasize on cold-chain logistics, resource integration of cold-chain logistics will be accelerated in the future.

8.3.3 Cross-Border Logistics Investments and Merger and Acquisition Will Become Major Trend

Factors that encourage China's logistics industry to speed up overseas investments and merger and acquisition will sustain for some time to come.

First, the Belt and Road Initiative is being actively carried out. Steered by the Initiative, China and major countries along the Belt and Road routes will continue to boost up trade and investments. Facilitation of infrastructure connectivity and expansion of capacity will provide major opportunities for logistics enterprises to accelerate the internationalization process. Some powerful logistics enterprises will speed up their effort in overseas layout and cultivate localized logistics by making direct overseas investments and merger and acquisition.

Second, internationalization of RMB will create more favorable financial and monetary support in overseas development for China's logistics industry. The internationalization trend of RMB will generate more financing channels for logistics enterprises to make overseas investments, reduce the cost of fund-raising or capital

transactions, improve financing efficiency, and provide favorable funding guarantee for the logistics enterprises to make overseas investments and development. Internationalization of RMB will encourage logistics enterprises to make overseas investments in RMB, thus reducing yield risks caused by foreign exchange fluctuation or interest rate fluctuation in host country.

Third, booming development of cross-border e-commerce will make cross-border logistics a blue sea of overseas investments for the logistics industry. In 2015, cross-border e-commerce in China had a transaction volume reaching 4.8 trillion RMB, accounting for 19.5% of import and export volume in China. According to predictions made by Ali Research, by 2020, the transaction volume of cross-border e-commerce in China will reach 12 trillion RMB, accounting for 37.6% of China's total foreign trade volume (Ali Research 2016). The "Overseas warehouse," the "Last Mile express delivery service," and the "cross-border collective transportation" related to cross-border e-commerce have become the growth points and opportunities of overseas presence in global logistics business.

8.3.4 Constrained by Multitude of Factors, Public Logistics Enterprises Face Challenges

Favored by investment institutions, the logistics industry has become a popular target of investing and financing. However, due to the multitude of constraining factors, it is unlikely to see an explosive growth in the number of public logistics enterprises.

First of all, logistics enterprises still have weak profitability. In recent years, due to rising wages and warehouse rents, the logistics industry has seen evident decline in profit margin, showing meager or even negative profit. In 2006–2015, major logistics enterprises saw annual business revenues rising by 10.7%, and annual business cost rising by 11.5%. In 2015, major logistics enterprises saw profits from logistics business receding by 4.3% from that of 2014. On average, the profit margin of logistics enterprises stood at 6.1%, dropping by 0.6 percentage points from that of 2014. These data show that the profitability of major logistics enterprises in China is riding a declining trend (CFLP and China Logistics Information Center 2017).

Second, the operations and management of logistics enterprises need to be more regulated. Most traditional logistics enterprises have poorly regulated operations and management. Their corporate governance, organizational structure, quality assurance, business management, financial management, remunerations management and welfare management are relatively primitive. The China Securities Regulatory Commission (CSRC) has stipulated strict requirements for corporate governance structure, internal control regulations, finance, taxation, and employee welfare of companies intending to initiate IPO. Certain logistics enterprises need to be strictly regulated before meeting such requirements, making it difficult for such enterprises to be listed in the stock market.

Third, profitability of logistics enterprises fluctuates widely. Many logistics enterprises rely heavily on specific customer groups. Change in customer groups will bring considerable instability to the operations of certain logistics enterprises, leaving their profitability unstable and bringing great negative impact on their IPO.

8.4 Summary

This chapter discusses the capital operations of logistics enterprises in China from three perspectives, namely, current situation and characteristics of capital operations in logistics enterprises, the role of capital operations in logistics industry, and the trend of capital operations in China's logistics industry.

In terms of current situation and characteristics of capital operations in China's logistics enterprises, the financing amount in logistics industry continues to rise; logistics Internet platforms has become the new favored targets of investments; many logistics enterprises initiate the IPO, and the express delivery industry is also seeking a capital boost. Logistics enterprises are becoming active in merger and acquisition, and domestic port enterprises are speeding up their integration.

Capital operation plays an increasingly visible role in the development of logistics industry in China. First, it helps expand the scale of the logistics enterprises and improve the concentration of the industry. Second, it provides the logistics enterprises with capital investments to upgrade the equipment and the R&D while elevating the technical level. Third, it supports the logistics enterprises to improve the network layout and upgrade the service level. In the end, it helps logistics enterprises extend their industrial chains and expand into new businesses.

There are several discernable trends regarding the capital operations in China's logistics industry. Intelligent logistics, e-commerce logistics, Internet platforms and other high-growth fields will become favored investment targets. Merger and acquisition will continue to be active in express delivery logistics and cold-chain logistics sectors. Cross-border investments and merger and acquisition in logistics will evolve into an important trend. However, due to the multitude of constraining factors, logistics enterprises face considerable challenges in going into IPO.

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Chapter 9

Development of Intelligent Logistics in China



Xiang Li

Intelligent logistics represents a global trend in the evolution of logistics industry, and is the focus of transformation and upgrading of logistics industry in China. At present, IoT, big data, automated logistic equipment and other technologies are developing robustly. “Made in China 2025,” “Internet+” Action Plan and other national strategies have been put into implementation. Unprecedented reform is happening in China’s logistics industry. Intelligent logistics is taking the lead in supply-side structural reform in logistics industry, and entering into the stage of rapid development.

This chapter contains four sections. Section 9.1 gives an overview of intelligent logistics, including the connotation, the major characteristics and the supporting technologies in intelligent logistics. Section 9.2 discusses the development environment of intelligent logistics in China, including the economic environment, policy environment and technical environment. Section 9.3 describes the current status of intelligent logistics in China, from the perspectives of intelligent transportation system, growth in intelligent logistics industry, synergetic development of logistics industry and manufacturing industry, and intelligent logistics in e-commerce. Section 9.4 offers some suggested directions for the future development of intelligent logistics in China.

9.1 Overview of Intelligent Logistics

Intelligent logistics is an important concept founded on the new-round of technological and industrial revolution, which highlights the high-level application of automated, informatized and intelligent technologies in modern logistics. To a large extent, the actualization of intelligent logistics dictates the operating efficiency and service level of logistics activities. This section gives a concise description of the connotations, characteristics, and supporting technologies of intelligent logistics.

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9.1.1 Connotations of Intelligent Logistics

9.1.1.1 Concept of Intelligent Logistics

The origination of intelligent logistics is closely tied to the concept and development of the Internet of things (IoT). In November 2005, the International Telecommunication Union (ITU) issued the *ITU Internet Reports 2005: the Internet of Things*, which put forward the concept IoT; a concept which is deemed as the third wave in the world's information industry after the prior waves of computers and the Internet. In February 2009, IBM publicized the "Smarter Planet Initiative," which captured the attention of a large community. In August of the same year, then Premier Wen Jiabao of China, when visiting Wuxi, proposed the ideal of "Perceptive China," expressing that China would grasp the opportunities and vigorously develop the IoT. Under such a background, China Logistics Technology Association (CLTA), along with the Editorial Boards of Chinese IoT (<http://www.chniot.cn/>) and the Logistics and Material Handling, in December 2009, were the first to put forward the concept of "intelligent logistics." In November 2011, the Ministry of Industry and Information Technology issued the *12th Five-year Plan of IoT Development*, which deemed intelligent logistics as one of the nine key demonstration applications in IoT.

9.1.1.2 Definition of Intelligent Logistics

Up to present, there is yet an authoritative definition of intelligent logistics. In this chapter, intelligent logistics is defined as using IoT technologies, automated logistics facilities and equipment, and intelligent decision supporting system as the technical scaffold, and realizing system cognition, holistic analysis, timely handling, automatic adjustment, and optimized decision in warehousing, distribution, circulation processing, and information service, thus improving the level of logistics service, and reducing logistics cost and resource consumption. The advanced logistics facilities and equipment ensure the intelligent operations of logistics; the intelligent decision support system provides support for intelligent interactions between logistics service providers and service targets; the IoT provides the platform to combine advanced logistics facilities and technologies with intelligent management and decision system.

9.1.2 Major Characteristics of Intelligent Logistics

9.1.2.1 Driven by Diverse Goals

The development of intelligent logistics is driven by diverse goals. Different subjects might have different goals and driving forces while carrying out the process of logistics activities. For example, logistics enterprises wish to reduce the logistics cost,

clients hope to receive quality logistics services, and environmental organizations may focus on the impact of logistics activities on social resources and the environment. As the highest level of modern logistics, intelligent logistics is expected to ensure the coordinated development of logistics activities in all stages and all aspects; at the same time, it ought to attain diverse development goals such as low cost, high efficiency, quality service, green and environmental development.

9.1.2.2 Interaction of Intelligent Perception

Interaction of intelligent perception is the basic characteristic of logistics in realizing intelligent operations and management. Intelligent logistics, via technologies of automated perception and data acquisition, obtain logistics data identifier and information to provide the data basis for intelligent logistics management. Based on this, intelligent logistics, via connections and interactions among logistics service providers, clients, logistics instruments and cargos, conveys the personalized demands for logistics service to logistics providers and instruments, so as to distribute logistics resources intelligently and coordinate all the logistics sectors. More importantly, intelligent logistics, by establishing deep-level linking among logistics factors, finds new laws automatically without human intervention, thus achieving independent propelling adaptive analysis, automatic optimization and self improvement of the logistics system.

9.1.2.3 Intensive Integration and Fusion

Intensive integration and fusion is an essential substance of intelligent logistics. From the technical perspective, intelligent logistics realizes seamless integration and intensive fusion of logistics technologies, systems' applications and management decision methods. From the perspective of activities, intelligent logistics includes all logistics activities during the process of internal production, and all logistics activities between logistics enterprises and between enterprises and individuals; it combines transportation, storage, packing, loading and unloading into an integrated system, thus providing the whole-process efficient logistics service to clients at the lowest cost.

9.1.3 Supporting Technologies of Intelligent Logistics

9.1.3.1 IoT Technologies

The Internet of Things, IoT, put simply, refers to the Internet connecting things to things. To be specific, it uses various high-tech methods to connect items in production or livelihood, via Internet, with intelligent processing systems. The key technologies include RFID technology, Sensor technology, GIS/GPS visual-

ization technology, Cloud Computing technology, and Virtual Reality/Augmented Reality (VR/AR) technology. Through information system, IoT integrates the above-mentioned key technologies to form the systematic application, composes the tri-layer structure consisting of the perception layer, transmission layer and network layer, thus realizing holistic perception, reliable transmission and intelligent processing. These three functions are the core functions that enable logistics operations to transform towards automated or even intelligent development.

9.1.3.2 Automated Logistics Equipment and Technologies

Automated logistics equipment mainly includes automated conveyor system, automated sorting system, and logistics robot. Automated logistics equipment constitutes the foundation of intelligent logistics, in particular, the foundation of intelligent warehousing operations system, whose technological level decides the level of logistics operations system. The automated conveyor system installs the Automatic Guided Vehicle (AGV) and the flexible railway through ground control system, intelligent dispatching system, and telecom system, so that the AGV can move supplies and materials on the complex tracks in a safe and efficient way. The automated sorting system can make continual and massive cargo sorting with high accuracy without human intervention. Logistics robot refers to the movable logistics conveyor equipment that integrates multiple technologies, such as mechanic automation, visual identification, position navigation, WiFi telecommunication, while finalizing the logistics operations such as automated conveying, piling and sorting; meanwhile, it also achieves environmental perception, dynamic decision, behavioral control, and execution. The above automated logistics equipment and technology integration is applied in high-rise warehouses, thus achieving stacked storage, automatic picking, Internet control, and standardized management of merchandises in warehouses.

9.1.3.3 Intelligent Decision Support System

Intelligent decision support system (IDSS) combines artificial intelligence (AI) with decision support system so as to use intelligent logics to solve complex problems. The key technologies of IDSS include data warehousing and data mining, artificial neural network, and intelligent computing. Data warehousing refers to the task of processing data from varied sources and having diverse structures, refining, extracting and maintaining them in the data warehouse; data mining, by extracting, calculating, analyzing and reasoning various data, uncovers the interrelationship among facts and provides a basis for the decision support system; artificial neural network, based on the working of biological neural network, simulates human being's intuitive thinking via image. It is a kind of system modeling technique that operates on the complex logical relations by ways of simplification, deduction, extraction and

learning; intelligent algorithm can be useful in finding optimal solutions to problems having certain commonality, and is often effective in solving practical large-scale discrete optimization problems.

9.2 Development Environment of Intelligent Logistics in China

At present, China's economy is in the New Normal phase featuring accelerated transformation of its economic development patterns. New growth forces are being fostered, and intelligent logistics has emerged into the era of exceptional development opportunities. Besides, development of intelligent logistics has benefited from policy assurance and technical support, thanks to the policies and plans instituted by the Government and the perpetual improvement of the industry's technological level.

9.2.1 Transformation and Development of China's Economy

9.2.1.1 Supply-Side Structural Reform

As China's economy gradually evolves into the phase featuring more elaborate style, better division of labor, and more rational structure, it will reach the resolution of demand-supply conflict at a higher level. The Government is making coordinated efforts to push forward industrialization, information development, urbanization, and agricultural modernization, thus continually unleashing the potential of domestic demand, and creating ample space for incessant and rapid growth in China's logistics industry. As e-commerce, manufacturing industry, agriculture and other related industries keep upgrading, the all-new supply models are formulated quickly. Accordingly, it is urgent to improve the quality and efficiency of logistics service supply by employing the technical means of intelligent logistics. The logistics industry will gradually break the current status of singular, homogeneous, and low-quality development in the industry, while transitioning towards a more diverse, elaborate and intelligent development.

9.2.1.2 Deep Integration Between Internet and Logistics

The "Internet+" Action Plan is driving industries in China toward establishing new forms featuring Internet-based, intelligent and synergetic development, so as to fuel new vitality to boost the economic and social development. Cooperation between logistics and e-commerce is going deeper; models of synergic development between logistics and modern agriculture, manufacturing industries and cross-border trade are

expanding. Online and offline interactions further link up physical flow, information flow and cash flow, engendering fused development between intelligent logistics and modern manufacturing industry and production service industry. Meanwhile, industries in urban distribution, cold-chain logistics, and express delivery are being ushered into the new era of development.

9.2.1.3 All-Around Two-Way Opening-up

China is now accelerating building its open economy and pushing forward the all-around two-way opening-up, which greatly impact the logistics industry in several ways. These include: domestic market of express parcel delivery is totally open, resulting in fiercer competition in the express delivery market; the Belt and Road Initiative is reaching the stage of substantive cooperation, so the establishment of international strategic logistics channel will be strengthened; the manufacturing industry in China is accelerating the pace of “going abroad,” creating favorable conditions for logistics enterprises to take the “follow-up” action and expand the overseas market; the implementation of FTZ strategy and the expansion of cross-border e-commerce mandate the logistics enterprises to upgrade their capability in order handling, cross-border transportation, overseas warehousing and overseas delivery. Intelligent logistics is an important means and avenue of fulfilling the above-mentioned development, and the focal point of competition for the logistics industry.

9.2.2 Relevant Policies Are Issued

China’s Government attaches great emphasis on the development of intelligent logistics. In the past two years, relevant departments have issued many policies and plans on intelligent logistics which have helped boost the development of intelligent logistics.

9.2.2.1 “Internet+” Logistics Policies

Relying on the key technologies of intelligent logistics, China has been issuing policies to boost the development of efficient “Internet+” logistics. In July 2015, the State Council of China issued the *Guidelines of Pushing forward “Internet+” Campaign*, which serves as the top-level edict of China’s “Internet+” strategy. Since then, relevant departments have issued the *Opinions on Implementing the “Internet + Distribution” Action Plan*, the *Opinions on Implementing the “Internet+” Efficient Logistics*, the *Plan of Pushing Forward Convenient “Internet+” and Promoting the Development of Intelligent Transport*, which deem “Internet+” logistics as a major field of development. At the same time, commercial logistics, as the key field of “Internet+” efficient logistics, has captured great attention. The Government has

recently issued the *Opinions on Pushing forward Online and Offline Interactions and Accelerating Innovation, Transformation and Upgrading of Commercial Distribution*, and the *Plan of E-commerce Logistics Development in China (2016–2020)*, which regard development of intelligent logistics as the core content.

9.2.2.2 Policies of Reducing Costs and Increasing Benefits in Logistics Industry

Intelligent logistics has become a chief means for China to reduce cost and improve efficiency of its logistics industry. In August 2016, the Ministry of Transport of P.R.C. issued *A Few Opinions of Pushing Forward Supply-side Structural Reform and Promoting Reducing Cost and Improving Efficiency in Logistics Industry*, which emphasized on accelerating the intensive, intelligent and standardized development of logistics industry and stipulated some specific proposals and plans. In September 2016, the General Office of the State Council transferred the *Action plan of Reducing Cost and Improving Efficiency in Logistics Industry for 2016–2018* issued by the National Development and Reform Commission, which proposed intensifying the application of big data and cloud computing, and establishing the integrated intelligent supply chain management service system geared towards corporate clients.

9.2.2.3 Policies in the 13th Five-Year Plan

Year 2016 marks the beginning of the 13th Five-year Plan period.¹ Several “13th Five-year” plans have been issued in the logistics field, with intelligent logistics being their core content. For example, in the field of comprehensive transportation, there are the *13th Five-year Plan in Information Development of Transportation*, the *13th Five-year Plan in Energy Saving and Environmental Protection in Transportation*, and the *13th Five-year Plan in Comprehensive Transportation Service*. There are also industry-specific plans such as the *13th Five-year Plan of Commercial and Trade Logistics*, and the *13th Five-year Plan of Express Delivery Development*. All above plans have proposed specific programs for developing intelligent logistics in the 13th Five-year Plan period.

¹The Five-Year Plan is an important part of China’s national economic planning. It mainly makes plans for major national construction projects, productivity distribution and important proportional relations of national economy, and sets goals and directions for the future development of national economy. The period from 2016 to 2020 is the time frame for the 13th Five-Year Plan.

9.2.2.4 Promoting the Implementation of Intelligent Logistics Distribution

In July 2015, the Ministry of Commerce issued the *Plan of Building Distribution System in Intelligent Logistics*, which proposed the guidelines, goals and seven major tasks in building the intelligent logistics delivery system. In July 2016, the Ministry of Commerce issued the *Notification of the General Office of the Ministry of Commerce about Designating the Demonstration Units for Intelligent Logistics Distribution*, which designated 85 demonstrations sites in China for intelligent logistics distribution.

9.2.3 Continually Enhanced Technological Support

9.2.3.1 IoT Technologies

IoT in China has made evident progress in R&D, standard-setting, industry cultivation and business application. IoT application has matured to the practicable stage, and become the foundation of implementing intelligent logistics. In recent years, the compound annual growth rate (CAGR) for the IoT industry in China has exceeded 30%, and has maintained a robust trend of growth. By 2015, the size of IoT industry in China had reached 750 billion RMB, rising by 29.3% YOY. The market size of the RFID industry had exceeded 40 billion RMB; the number of Micro-electromechanical systems, MEMS, had exceeded 73 million, accounting for 30% of the world's total and remained as the world's largest market. Manufacturing industry of telecom devices had maintained a relatively strong international competitiveness. China had established the world's largest public telecom network and Internet with most advanced technologies. Figure 9.1 shows the market size and growth rate of IoT industry in China for 2010–2015.

Breakthroughs have been made in R&D and standard-making. China has achieved fruitful results after having endeavored for many years in the fields of chip-making, telecom protocol, network management, coordinated processing, and intelligent computing. For instance, the “ISO/IEC 20005: 2013 Information technology—Sensor networks—Services and interfaces supporting collaborative information processing in intelligent sensor networks,” which is the first international standard established in IoT field by China as a member nation, which makes China one of the leading countries in the ISO Sensor Networks Standard Work Team. Besides, China has established industrial alliances and R&D centers in Beijing, Shanghai, Wuxi, Hangzhou, Guangzhou, Shenzhen, Wuhan and Chongqing. It has initially set up four regional industrial clusters in the circum-Bohai Sea Region, the Yangtze River Delta, the Pearl River Delta, and the Central and Western Region. Each regional industrial cluster has its own specialty, yet collectively they are coordinated in industrial fields and public services.

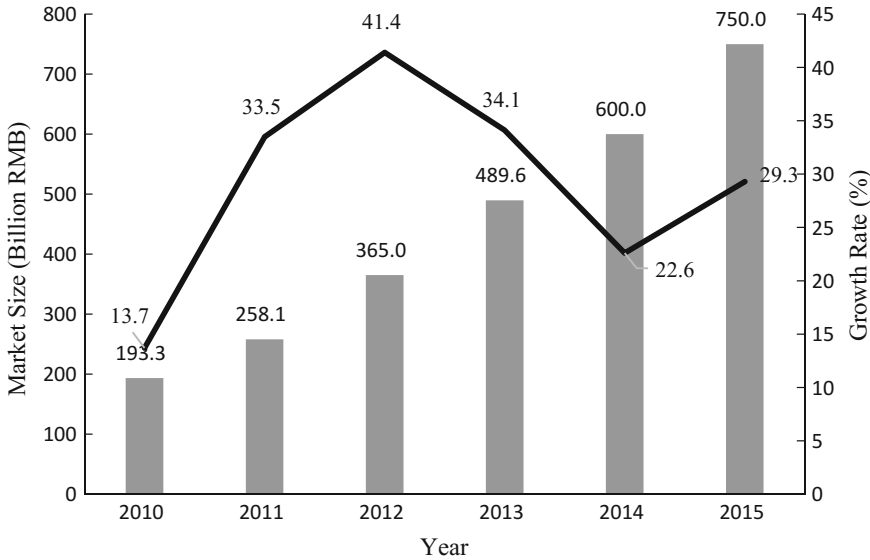


Fig. 9.1 Market size and growth rate of IoT industry in China for 2010–2015. *Source* Compiled from (i) “2015 China RFID Industry Development Status Analysis,” published by China Electronic Distribution Association, and (ii) “2016 China Internet of Things Industry Market Size and Development Trend Analysis,” published by Zhiyan Group. http://www.eepw.com.cn/article/201608/295604_2.htm; <http://www.chyxx.com/industry/201605/417702.html>

9.2.3.2 Automated Logistics Equipment and Technologies

China is constantly elevating the market scale and technical level of its automated logistics equipment and technologies. Automated High-rise Warehouse (AHW), Automatic Guided Vehicle (AGV), Automatic Sorting Conveyor System (ASCS), and other major logistics technologies and equipment have grown rapidly, infusing fresh driving force into the market.

During the 12th Five-year Plan period, automated logistics equipment market in China grew swiftly at an annual growth rate of 20%. The segmented fields of automated logistics equipment market, which have great technological content and relatively large market size, are AHW, AGV and ASCS. In 2015, the market size of AHW in China exceeded 10 billion RMB, with growth rate exceeding 20%, and had held a CAGR of about 20% in the past ten years. There were 4300 units of AGV added in 2015, with YOY growth rate exceeding 36%. Also in 2015, the market size of ASCS reached 21.6 billion RMB, rising by 31% YOY, with a CAGR surpassing 30% in the past five years (Hang Seng 2016).

Though the development of automated logistics equipment and technologies had a late start only a few years ago in China, it is narrowing the gap between that of the overseas advanced technologies. AHW was the first such facility applied in China, which is by now a matured technology and has the highest rate of domestic pro-

duction; most of China's AHW facilities are domestically manufactured. In the past ten years, AGV has been developing rapidly. Domestic manufacturers are now taking 60% of the market share of AGV products. In particular, manufacturers such as Kunming Shipbuilding Equipment Co., Ltd. and Shanghai SIASUN Co., Ltd. have developed AGV systems with independent intellectual property rights (IIPR), thus acquired the capability of product development, engineering design and engineering implementation. As for ASCS technologies, China's manufacturers still lag behind the overseas manufacturers. However, more than ten manufacturers in China have developed their own high-speed sorting conveyor system. China-made brand-name ASCS productions with core technologies are likely to attain the substitution growth in the future wave of domestic manufacturing. Table 9.1 exhibits the market competition status of key automated logistics equipment in China.

Table 9.1 Market competition status of key automated logistics equipment in China

Category	Technical gap	Market competition layout	Major suppliers
Automatic Sorting Conveyor System, ASCS	Late start; large technical gap between overseas countries and China	Foreign manufacturers take the majority of the market shares; domestic manufacturers are still in the phase of product validation	DEMATIC, BEUMER, SSI SCHAEFER, Vanderlande, and Damon, etc.
Automatic Guided Vehicle, AGV	The technical gap between overseas countries and China is small	Domestic manufacturers have 60% market share, overseas manufacturers have 40% market share; of the domestic brands, Kunming Shipbuilding Equipment and Shanghai SIASUN take more than 50% market share	Kunming Shipbuilding Equipment and Shanghai SIASUN, etc.
Automatic High-rise Warehouse, AHW	China entered this field early, and has developed almost the same level of technologies as that of foreign nations	Mainly domestic manufacturers, which are scattered	Beijing Gaoke, Wuxi Zhongding, and New Trend International, etc.

Source Compiled from the report *Demand Expansion on Automatic Logistics Equipment* (2016), published by Guangzheng Hang Seng

9.2.3.3 Big Data and Other Information Technologies

Information industry in China has grown rapidly in recent years with evident breakthroughs in technical innovations; the Internet economy is becoming more prosperous, and generates an abundant amount of data resources. These factors have afforded a solid foundation for the accelerated growth of intelligent logistics.

System of information industry is gradually taking shape lately. In 2015, information industry in China accrued revenue of 17.1 trillion RMB, of which software and IT service industry made revenue of 4.3 trillion RMB, rising by 15.7% YOY. Large data centers are making green and intensive development, and 295 enterprises are conducting cross-regional Internet data center business (Ministry of Industry and Information Technology of P.R.C. 2016). Cloud computing service has become more mature. The scale of data processing in major cloud computing platforms has reached the leading position in the world. China is concertedly developing the Virtual Reality (VR) industry, with VR applications spreading to entertainment, art, education, and industrial manufacturing management. A number of new models and business forms have emerged in the development of information resources and technical applications; the startups and innovations in high-tech information technologies based on big data, cloud computing and VR/AR are becoming more active.

Recently, evident breakthroughs have been made in technical innovations and applications. In terms of software and hardware, major software and hardware producers in China have launched the big-data fundamental platform products on their own; a number of information service providers have developed data analytical tools for some specific fields to provide innovative data services. In terms of platform development, leading Internet companies have more than 10,000 servers, thus gaining the technical capability of building and utilizing big-data platforms. In terms of intelligent analysis, some companies are actively developing pioneering AI technologies such as deep-learning, thus staking the high ground in IT. In addition, big data and other technical applications are moving forward positively, which effectively encourage the logistics industry to use the rich data resources. Meantime, the industry is exploring demand forecasting, customer classifications, operations optimization and quality assessment, for the purpose of speeding up the service optimization, business innovation and the pace of industrial upgrading.

9.3 Development of Intelligent Logistics in China

Propelled by a new round of technological and industrial revolution, typified by the Internet of Things, “Internet+,” and “Industry 4.0,” intelligent logistics in China is marching forward briskly. Intelligent logistics is not only the emphasis of China’s efforts to build its transportation system, but also the breakthrough point for the logistics industry to reduce cost, improve efficiency and realize upgrading and trans-

formation. At the same time, intelligent logistics has forged greater synergy with manufacturing industry and e-commerce, becoming the important support catering to lean production, flexible manufacturing, and promoting the consumption upgrading and further development of e-commerce.

9.3.1 Speed up Building Intelligent Transportation System

9.3.1.1 Development of Intelligent Transportation Technologies

Over the last decade, China has made many innovative advances in key technical fields of intelligent transportation, providing effective technical support to improve the efficiency of comprehensive transportation system while making necessary technical reserves for long-term and sustainable development of intelligent transportation system.

Since 2005, the National High-tech R&D Program (the so-called “863 Program”) has begun to study modern transportation technologies as a distinct domain. China has since successfully developed new methods, technologies and strategic products with Independent Intellectual Property Right (IIPR) in the field of intelligent transportation. Since 2010, the 863 Program, the National Key Technologies R&D program² and other programs, focusing on developing intelligent transportation management system, have endeavored to support the development of a number of key technologies and major products for intelligent transportation system, thus solving some technical bottlenecks and strategic problems that constrain the advancement of comprehensive transportation system in China. The major projects in this regard include: developing the perception and interaction system and key technologies of the state of transportation vehicles; developing area transportation synergetic and linked control system and key technologies for large cities; developing the intelligent control system for comprehensive transportation system, and building the framework system for vehicle and highway synergetic technologies in China.

²The 863 Program and the National Key Technologies R&D program are national programs of technical development spearheaded by China’s Government and targeting at specific fields. The 863 Program focuses on solving strategic, forward-looking and cutting-edge technical problems bearing upon the long-term development and national security issues, and coordinates the integrated application and industrialized demonstration of high-techs; the National Key Technologies R&D Program, oriented towards major scientific and technological demands of the national economy and social development, emphasizes on solving the strategic, comprehensive, cross-industry and trans-regional sci-tech problems.

9.3.1.2 Implementation of Intelligent Transportation System

While carrying out the R&D on the system of intelligent transportation, China has also been implementing its key technologies in building many projects of intelligent transportation systems on a broader scale. China has continued to push forward building of national public logistics information platform. Since established in 2007, the National Transport and Logistics Public Information Platform (LOGINK) has grown from a local platform built by Hangzhou Transport Administration to a national one. The platform has drawn much business, and shared copious amount of information on domestic and overseas logistics. Nowadays, the platform exchanges 2 million pieces of information on a daily basis and collects big data of 300,000 small and medium-sized logistic enterprises (Source: news.hexun.com 2015). In January 2015, the 56888 intelligent logistics service platform, as a national intelligent logistics integrated service platform, was put into use. This platform is linked to various external platforms in civil service, public security, bank, insurance, highway, railway, civil aviation, weather, mobile systems, and provides various service software and professional services. In April 2015, China Railway Corporation launched the “<http://www.95306.cn/>” to provide clients with services such as railway freight e-commerce, commodities and small-commodity trading, etc. In May 2015, China Transport Telecommunications & Information Center (CTTIC) and Alibaba’s subsidiary Aliyun Cloud Computing formed the partnership of “Internet+shipping” to launch Myships.com, a platform of comprehensive information service for shipping. Myships.com opens data interface to the entire society, uses the real-time data and historical data on the cloud platform, and offers services such as AIS query of ship location, query of ship’s historic track, global chart operation, fleet management, and oceanic weather forecast information.

The intelligent transport systems for railway, waterway and aviation have also made great progress. In terms of railway, China has built the world’s largest railway computer network system, railway transport management information system, and railway monitoring and emergency command system, thus greatly enhanced the comprehensive intelligence of railway freight service. In terms of waterway, on the one hand, the inner-river waterway intelligent development has made great progress, which is exemplified by the Three Gorges navigation informatization, the Yangtze River Channel elements intelligent cognition and its comprehensive applications, and the Lancang-Mekong River Basin ship visualization system. On the other hand, the application of “Internet+”, AI, and other technologies has elevated the intelligence level of port operations in China. Ningbo, Shanghai, Tianjin, Dalian, Shenzhen and several other ports are taking the lead in intelligence development. For example, the Phase One of WellOcean system, which focuses on cargo tallying, was put into use in Daxie Container Terminal of Ningbo-Zhoushan Port, thus for the first time realizing human-less intelligent cargo tallying in container terminals. In the field of civil aviation, major progress has been made in new-generation air traffic management system. Basically, China has established the aviation navigation, aviation monitoring, synergetic control of air traffic operations and air traffic control information service platform that is based on data chain and precision positioning.

9.3.2 *Logistics Industry Accelerates Intelligent Growth*

9.3.2.1 *Intelligent Logistics Technologies Are Applied Extensively*

Intelligent logistics involves extensive logistics processes and fields. In China, technologies of intelligent logistics have been applied in warehousing, transportation and distribution. It is also developing towards integrated service.

In terms of warehousing operations, intelligent logistics mainly involves application of RFID and other IoT technologies, automated warehousing equipment, and backstage information system. For example, China FAW Group Corporation, cored on RFID and IoT technologies, has designed and built the vehicle warehousing positioning management system. By automatically identifying the V-RFID electronic tag, the system fulfills the functions of automatically-generated warehouse entry slip, parking position, warehouse exiting slip, matching-board management, and in-transit management. This system is an AI system for the entire logistic process of vehicle warehousing. At the same time, it is a tracking-type information-based logistics service system.

Transportation and distribution mainly involve real-time planning, choosing, and scheduling vehicle delivery routes based on RFID and GPS/GIS technologies as well as OLAP technology; these technologies are applied to such fields as trunk transportation, home delivery through express, intermodal container transportation, cold chain, and hazardous goods transport. For example, CNEX Express Co., Ltd. has established an intelligent scheduling optimization system for city delivery installed on mobile terminals by integrating GPS, GIS/GSM and other technologies, and intelligent optimization algorithms. As another example, Ubest Logistics, which is engaged in transportation of civil explosives and hazardous chemicals, has realized intelligent supervisory functions such as collection of data on vehicles carrying hazardous goods, tracking and monitoring, alarming against deviation from the set route and emergency alarming, by organically integrating RFID, GPS technology, vehicle systems and oil level, tire pressure, video and other IoT sensing technologies. With respect to community express services, SF Express, STO Express, ZTO Express, Yunda Express and Global Logistic Properties Limited (GLP) have jointly founded Shenzhen HiveBox Technology Co., Ltd., which is committed to the R&D and promotion of Hivebox smart express cabinet, so that express collection and delivery business can develop into platform-based services providing optimal experience to the clients.

Apart from the applications to certain logistics links, intelligent logistics technologies are also developing towards integrated applications, i.e., providing integrated cloud services including warehousing, home delivery and even supply chain, and finance. For example, SF Express has improved the e-commerce ecosystem of warehousing, distribution and logistics, and opened the nationwide warehouse resources by integrating its information, warehousing, trunk and home delivery networks; meanwhile, it has increased service efficiency by means of multi-warehouse combination, intelligent sub-warehouses and efficient warehouse placements, and has

launched timely logistic services such as same-day and next-day delivery through purchasing from its cloud OFC (order fulfillment center). By virtue of “SF Data Lighthouse”, its big data service product, SF Express also makes full use of big data computation and analysis to provide customers with comprehensive decision-making support in logistics and warehousing, market development, precision marketing, and e-commerce operations and management, based on its mass logistics data commercial data.

9.3.2.2 Intelligent Logistics Index Shows Elevated Level of Intelligence of Logistics Industry

In March 2017, the China Academy of Transportation Sciences, Cainiao Network and Ali Research Institute jointly released the “Big Data Development Index on Intelligent Logistics,” providing a quantitative basis for assessing how data-intensive and intelligent China’s logistics industry is. The index system consists of three primary indicators, i.e., data-oriented logistics business, intelligent synergetic development, and data infrastructure, and several secondary indicators. These indicators are dynamically updated every month. In the calculation, numbers 0–100 are selected for evaluation; with 100 representing the highest level. Numbers 0–30 indicate preliminary development, 30–70 for rapid development, 70–90 for relative maturity, and above 90 for complete maturity.

First, the 2016 Big Data Development Index on China’s Intelligent Logistics was 40.9, indicating that the intelligent level of logistics industry was in the stage of rapid development. Specifically, data-oriented logistics business developed fairly well, with a primary indicator value of 56.3. The completeness of data on detailed domestic logistics was 84.8, suggesting that the ability of domestic logistics industry to build information systems and create data synergy as well as the penetration of intelligent hand-held terminals and other data equipment had reached a high level. In contrast, the index of completeness of data on detailed cross-border logistics was only 13.5, implying that acquisition of data on cross-border logistics was still in its infancy due to the weakness in multi-party collaboration. Secondly, intelligent synergetic development was in the middle stage of rapid development with an index of 45.9. The average intelligent routing sorting rate was 74.2, reflecting that the synergy between different logistics links had improved rapidly and had reached the stage of relative maturity; the index for penetration of electronic orders was 63, showing that logistics enterprises had been highly data-oriented in such basic fields as data collection, entry and transmission. The index of terminal synergy rate was 9.4 in December 2016, indicating that this aspect is at the initial stage. Finally, the index for data infrastructure indicator increased from 5.0 in early 2016 to 25.4 in December, reflecting a rapid development in data infrastructure though it was still in its formative stage.

9.3.3 Continuously Deepened Synergy Between Intelligent Logistics and Manufacturing

9.3.3.1 Promotion of Lean Production Management and Better Quality Control by Intelligent Logistics

Intelligent logistics is a key link in connecting supply, production and sales, and the cornerstone of modern production management system. The pursuit of intelligent logistics in the manufacturing industry helps boost the integration of traditional production models with network-based, visual and flexible production, thereby raising the level of lean production management and quality control.

For example, based on the characteristics of tobacco production, the operations and relevant management requirements, China Tobacco Zhejiang Industrial Co., Ltd. has upgraded and improved its ERP system by putting into practice RFID, IoT, big data and other technologies; it further refined the granularity of materials management and satisfied the requirements for complete materials tracking and quality tracing. Specifically, China Tobacco Zhejiang Industrial Co., Ltd. has taken the following measures: (i) extending the application of automatic identification labels (barcodes and RFID) from finished products and pallets to storage locations, vehicles and all packages of tobacco leaves and raw materials, (ii) setting up hundreds of read-write points and sensors at logistics links such as tobacco acquisition, sorting, access to raw materials warehouse, access to the factory, production line, access to finished products warehouse, transportation and arrival at commercial logistics centers, (iii) sending mass data acquired to the background batch management and quality tracing system via WLAN and mobile 3G network in transit for recording, analysis and processing; (iv) putting forward and implementing the full supply chain batch management based on the minimum packing unit, which covers raw materials, cases of finished products, cartons of cigarettes and even packs of cigarettes (information on each pack of cigarettes is kept by the unique and original five-digit raised seal on the pack). These measures are based on the complete IoT system and the smallest tracking granularity for logistics of tobacco products, so that information on logistics is integrated into production to realize intelligent application of tracking and tracing big data to the following aspects: analysis of tobacco blend structure, statistics of process indicators, analysis of external quality of finished products, analysis of batches on complaints, and multi-batch comparison.

9.3.3.2 Optimization and Organizational Collaboration of Supply Chain Process Driven by Intelligent Logistics

By enhancing the capability of information exchange, sharing and analysis, the intelligent logistics system is embedded in manufacturing and supply chain processes, so that supply, production and sales links as well as the upstream and downstream of the

supply chain are interconnected in real time; supply chain processes are optimized, and the organizational collaboration of the supply chain is improved dramatically.

For example, Qingdao Beihai Shipbuilding Heavy Industry Co., Ltd. (hereinafter referred to as BSIC) and the Qingdao Branch of China National Material Storage and Transportation Corporation (hereinafter referred to as CMST) have carried out collaborative cooperation in the field of ship plate logistics management. CMST Qingdao Branch customized an information-based ship plate management system for BSIC, based on IoT; it reengineered the entire process ranging from procurement, transportation, loading and unloading, storage, warehousing, flap delivery, production of fishplate bar, preprocessing, and production of ship plate. The specific benefits are as follows: (i) The inventory management level of ship plate is improved, so that the actual storage capability is doubled and the speed of goods unloading and receiving is increased by 30%. (ii) The supply of ship plate is more accurate and timely, with the accuracy up to 100%, thus raising the efficiency of swapping and turnover. (iii) The shipbuilding efficiency of CMST Qingdao Branch is enhanced, the production capacity of each operation is increased by 30% and the shipbuilding cycle is shortened by 20%. In another example, Hangzhou Iron and Steel Group Company established cooperation with Zhejiang Bada Logistics, which specializes in railway logistics, on building a supply chain information system for whole-process tracking and management, while reengineering the raw material inbound logistics process. In collaboration with the steel mills, seaports and railways, it achieved the unified planning, organization, control and coordination of supply sources at port, scheduled train operations, receiving and unloading of steels from Hangzhou Iron and Steel Group Company, and factory production.

9.3.4 E-commerce Enterprises Strive to Develop Intelligent Logistics for Service Optimization

After years of development, the competition pattern of e-commerce in China has become clear. Tmall.com, JD.com and Suning.com have maintained the top three spots in the domestic B2C e-commerce market for many years. When online traffic and platform size have basically taken shape, creating intelligent logistics to upgrade and perfect the offline logistics service network becomes a growth driver with greater potential.

9.3.4.1 E-commerce and Logistics Enterprises Build Strategic Alliances to Promote Intelligent Logistics

In May 2013, Alibaba joined forces with SF Express, STO Express, YTO Express, ZTO Express, Yunda Express, ZJS Express, BEST Express and related investment groups and financial institutions, and announced the establishment of Cainiao Net-

work Technology Co., Ltd. (hereinafter referred to as Cainiao.) In March 2016, Cainiao and several express delivery companies set up the “Cainiao Alliance.” By fully exploiting the application of intelligent technologies such as IoT and cloud computing, and combining with the advantages of Alibaba and Cainiao Alliance, the collaboration has elevated to a three-dimensional layout in the field of intelligent logistics.

In terms of business digitization, in May 2014, Cainiao Electronic Sheet was formally introduced, which was designed according to the “N-1-N” model. In the “N-1-N” model, the first “N” refers to connection with “N” merchants on the front end, the second “N” refers to connection with “N” express delivery companies on the back end, and “1” refers to the provision of technical support by Cainiao both for the front and back ends. In 2016, the penetration rate of Cainiao Electronic Sheet into the e-commerce platform of Alibaba Electronic System (Tmall + Taobao) reached nearly 80%, an increase of nearly 1.6 times as much as that at the beginning of 2015; the misclassification rate in transit link was reduced by 40% on average.

In terms of intelligent warehousing, the first automated warehouse of Cainiao opened its doors in Guangzhou in August 2016, enabling the unmanned process from receipt of orders to delivery of parcels (except for the linkage of bar code review), which has the following functions: (i) automatic identification to find workers for parcels; (ii) intelligent selection of cartons through big data; (iii) automatic sealing of cartons by robot; (iv) order sorting by intelligent routing; (v) intelligent arrangement of goods storage in the warehouse through big data. This automated warehouse is dedicated to providing storage and sorting services for Tmall Supermarket. By integrating transportation, warehousing, loading, unloading and handling as a whole, work efficiency is improved by over 30% and the accuracy of order picking is at nearly 100%.

In terms of intelligent distribution, at present, domestic express services generally make “nationwide distribution from single service point,” and the average distance of trunk transportation of parcels is greater than 1000 km. Cainiao network adopts the intelligent sub-warehousing, utilizes the big data technology to predict future sales of goods, and pre-stock goods to the sub-warehouses nearest to the consumers, thus greatly shortening the delivery distance. In addition, Cainiao network integrates social resources to speed up the construction of intelligent distribution networks at the county level, and reducing the per order delivery costs for rural areas by more than 0.5 RMB. By utilizing collective delivery instead of the regular itemized parcel delivery in the rural areas, it reduces the distribution cost by more than 50%. In terms of service expansion, Cainiao has collaborated with Alibaba Cloud (cn.aliyun.com) to build a data-driven and socialized logistics and supply chain platform. They have successively launched services such as the four-level address database, the early warning radar for logistics, and the intelligent inventory and distribution dispatch optimization. In terms of cross-border services, Cainiao has been improving the timeliness of logistic services for major import and export routes and has launched a global intelligent distribution platform that enables cross-border logistics links to be seamlessly connected from end to end through the technology interface. Currently, Cainiao’s cross-border network has access to 110 warehouses, with service cover-

ing 224 countries and regions. In September 2016, Cainiao Network and Mybank (Mybank.cn) formally launched the financial products related to logistics supply chain, with an aim to extend from sales end to production end, and expand from logistic services to financial services; which opens up an access to inventory and sales credit through big data algorithms, and offers financial solutions that are applicable to all logistic links.

9.3.4.2 Construction of Intelligent Logistics System for Self-Built Logistics of E-commerce Enterprises

As a model of self-built logistics by e-commerce enterprises, Jingdong has now built a specialized, automated and large-scale logistics network system that integrates warehousing and distribution as a whole. As of October 2016, this logistics network has already laid out seven intelligent logistics centers (including Asia No. 1), 254 large-scale automated warehouses, 6780 distribution stations and self-pick-up outlets. Of them, Asia No. 1 is one of the largest and most modernized logistics centers in the B2C industry; it is operated per the “high-rise warehouses + robots” mode so that goods can be stored/retrieved automatically by robots, together with automatic task assignment, transmitting, sorting, as well as synthesizing via background system (Xinhuanet.com 2016).

In addition, Jingdong has also set up an X Division and a Y Division. The X Division focuses on the R&D of unmanned technology, including UAVs, driverless vehicles, unmanned warehouses and other intelligent logistics facilities and equipment, dedicated to enhancing the logistics efficiency via intelligent technologies. The Y Division focuses on building intelligent supply chain capabilities, aimed at offering integrated solutions to warehousing, distribution, marketing and after-sales supply chain and supply chain finance. This development relies on the technical advantages of big data, artificial intelligence, and cloud computing which Jingdong has accumulated in the logistics field for years, thus helping the clients make more intelligent and optimized decisions regarding operations of multiple sub-warehouses, forecasting plans, and precision stocking. In October 2016, Jingdong announced its “open and intelligent logistics” strategy and introduced the new brand-name “Jingdong Logistics,” which is dedicated to providing logistic services to all merchants on the JD.com platform and all other businesses. Jingdong vows that it would focus on cloud computing, artificial intelligence and robotics innovation to further enhance the efficiency and experience of Jingdong logistics services.

As a leading e-commerce business evolved from a traditional retailer, Suning has continuously pushed forward its development strategy of technological transformation and intelligent service since 2011; it has also gradually explored the business model of online and offline integration and all-category services. Suning logistics has also become the accentuated plotting and business focus in its restructuring process. In November 2016, Suning Cloud Store was built in Nanjing with the goal of creating a world-leading intelligent logistics hub. On the one hand, Suning Cloud Store operates under the high-density automatic storage, “goods to worker” pick-

ing, and automatic distribution systems, utilizing hardware technologies such as the automatic access system (Automated Storage and Retrieval System, AS/RS), the Schaefer Miniload Crane, and the Revolving Carousel. On the other hand, relying on the independently developed Suning LEGO logistics system platform, the Suning Compass warehouse control system, and the Suning Eye Platform logistics monitoring system, goods can be intelligently monitored, analyzed and controlled in the entire processes, ranging from warehousing, replenishment, picking, distribution and delivery. In addition to logistic services for Suning, Suning Cloud Store also serves all merchants on the Suning.com platform and all partners at upstream and downstream of Suning supply chain. At present, more than one thousand suppliers have access to the Suning Cloud Store. In the future, Suning will take Nanjing as a model to further upgrade its national-level warehouses in 12 central cities such as Beijing, Shanghai, Guangzhou and Chengdu to build an intelligent cloud warehouse system covering the whole country.

In December 2016, Suning announced the establishment of Suning Logistics Research Institute and the S Laboratory. The Suning Logistics Research Institute will devote itself to intelligent logistics planning, sharing of supply chain intelligence, and intelligent technology research, in an effort to create an intelligent logistics platform as support for the construction of intelligent logistics ecology in a systematic way. It will invest 100 million RMB to initiate a development effort for intelligent technologies and systems founded on “Super Warehouse, Super Distribution and Super Algorithm.” The S Laboratory will concentrate on two applied research areas in lean logistics and artificial intelligence, including automated warehousing operations technology, green packaging technology, intelligent picking robots, intelligent delivery robots, intelligent surveillance of industrial parks by UAV, and AR/VR technology.

9.4 Measures for Development of China’s Intelligent Logistics

Although China’s intelligent logistics has made some progress, it is still in the early stage. Measures for fostering future development of China’s intelligent logistics are: constructing the information connection and sharing system for intelligent logistics, encouraging and supporting enterprises to strengthen their R&D and application of core technologies of intelligent logistics, promoting innovative, high-efficiency and intelligent logistics models, and strengthening the innovation of management system and mechanism as well as policy guidance.

9.4.1 Construction of Information Connection and Sharing System

Promoting the traditional logistics activities toward information-based and data-based development and improving the opening and sharing of logistics-related information, especially the information of government agencies, are the basic conditions for the development of intelligent logistics. Therefore, it is suggested that the following steps be considered. (1) The government should promote the opening-up of logistics data. Specifically, it should study and formulate the directory of opened logistics data, guide the industrial associations, research institutions and public service institutions to acquire and analyze logistics operations data, and accelerate the construction of platforms for national transportation logistics public information and various other types of information, such as trading of logistics resources, vehicle and freight matching, and safety supervision. (2) The enterprises should strengthen the data-based representations of logistics activities. Specifically, they should further promote the application of logistics information technology and logistics informationization, collect information on logistics transactions and logistics activities by electronic and data-based means, and promote the application of information carriers of data-based logistics activities like electronic orders and electronic contracts.

9.4.2 Strengthening the R&D and Application of Core Technology

Developing the core intelligent technologies like Internet of Things and enhancing their application are the critical means to improving the online/offline intelligent, integrative and synergic development, and enhancing the operations efficiency of the storage and distribution linkages. Therefore, it is suggested that the following actions be taken. (1) The network of intelligent storage facilities should be improved. The Government should encourage all types of market players to participate in the building of intelligent storage infrastructure, and transportation and distribution cloud service platform. The enterprises should also optimize their storage and distribution operations and management, employing big data, cloud computing, deep learning and other intelligent technologies with logistics information. (2) Relevant research entities should strengthen the R&D and application of intelligent distribution technology. They should carry out research and application of key technologies (including product tracking and positioning, radio frequency identification, visualization, mobile information service, and navigation integration system), focusing on the major links of product traceability, online management of distribution and dispatching, and intelligent allocation. They should also bolster the research of high technologies like unmanned vehicle, robot and virtual reality, and explore their probable applications in logistics.

9.4.3 Development of High-Efficiency and Intelligent Logistics Models

Innovating intelligent logistics development and service business models relying on the deep integration of Internet and logistics will help integrate and optimize all kinds of logistics resources like transportation and storage on a larger platform, and improve the efficiency of logistics in an all-around way. Therefore, it is suggested that the following measures be considered. (1) The industry should continue to develop logistics information platforms such as highway port, integrate offline logistics resources, support the construction of multimodal transportation public information platform, and promote multimodal transport information exchange and sharing. (2) The Government should encourage enterprises to establish national or regional storage resource online trading platforms basing on the technology of Internet and Internet of Things, promote the online opening and real-time trading of storage resources, integrate the existing storage facility resources, and improve the storage utilization efficiency. (3) The Government should encourage the logistics enterprises to form alliances based on resources integration and benefit sharing so as to integrate the disparate transport, storage, distribution and other logistics business resources, relying on the intelligent logistics information technology. Also, it should encourage logistics enterprises to provide extended services to the upstream and downstream sectors of the supply chain, relying on intelligent logistics so as to promote the interaction and synergic development between logistics and manufacturing, commerce, finance and other industries.

9.4.4 Improvement of Policy System and Management Mechanism

In view of the rapid development of technologies and their impact on the logistics industry, the existing policy planning and management system may be inadequate. This requires the Government to accelerate the improvement of relevant policy systems and management mechanisms to afford a more favorable policy environment for the development of intelligent logistics. Therefore, it is suggested that the following steps be taken. (1) The Government should place more emphasis on policy formulation, planning, and standardization regarding intelligent logistics. It should speed up the formulation of policy planning, especially mid-term and long-term plans, concerning the research and application of intelligent logistics technology, accelerate the drafting and revision of standards on technology, equipment and the process of intelligent logistics, and establish and perfect the standards on the collection, administration, opening-up and application of data from the industry and enterprises. (2) The Government should institute innovation on the management mechanism and system. It should form a rapid response and updating system on management practices, laws and regulations, and eliminate the system and mechanism that constrain the devel-

opment of intelligent logistics, so as to promote the development of new logistics genres and models. (3) The Government should create a fair and orderly market environment. It should strengthen the protection of intellectual property rights, enhance the research capability of auxiliary technologies for intelligent logistics, improve the market access system in relevant fields, and encourage all types of social capital to participate in the deeper integration of intelligent logistics with manufacturing and business fields.

9.5 Summary

This chapter mainly introduces the development of China's intelligent logistics from four aspects: the overview, the environment, the current status and the development measures. First, it expounds on the definition, the characteristics and the supporting technologies of intelligent logistics. Second, it analyzes the development environment of China's intelligent logistics, and points out that its development is intimately correlated with the transformation and upgrading of China's economy and the continuing improvement of its technological support. Meanwhile, the policy environment of China's intelligent logistics is also perpetually upgraded. Third, it describes the current status of China's intelligent logistics from four perspectives: (1) the research projects of intelligent transportation system have attained notable achievements; (2) the level of intelligent operations of the logistics industry has seen extensive growth and intelligent logistics technologies are applied broadly; (3) the synergic development of intelligent logistics and manufacturing industry has gained speed, which has improved the efficiency and lifted the level of production operations and supply chain management; (4) the e-commerce enterprises are vigorously developing intelligent logistics through strategic alliance with logistics enterprises or establishing their own logistics operations, which have propelled the upgrading and improvement of logistics service network of China's e-commerce. Finally, this chapter puts forward and measures and suggestions for the development of China's intelligent logistics, including strengthening the construction of information connection and sharing system for intelligent logistics, accelerating the research and application of intelligent logistics technology, innovating the business models of intelligent logistics operations and services, and hastening the improvement of relevant policy systems and management mechanisms.

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Chapter 10

Development of Regional Logistics in the Belt and Road



Jun Liu

By 2016, China has made evident progress in substantiating the policy communication, facility connectivity, financial integration, unimpeded trade and people-to-people bond (or the “Five-Pronged Approach”) with the nations along the “Belt and Road.” Logistics industry, as the fundamental and strategic industry that supports regional economic growth, constitutes the integral part of China’s Belt and Road (the B&R) Initiative. At present, China has basically established the B&R logistics system. As economic and trade activities become more active along the B&R, the logistics market is rapidly taking shape.

This chapter includes three sections. Section 10.1 gives an overview of the B&R Initiative, including its major contents, response of the international community, and the progress made as of 2016. Section 10.2 introduces the framework and the progress in constructing the B&R logistics system, according to the top-level plan of the B&R made by the China’s Government. The progress made mainly includes the six corridors of economic cooperation along the B&R, the major maritime nodes and Customs clearance, and the cross-border logistics service system. Section 10.3 points out the influence of B&R development on logistics market in China, from the perspectives of government policies, market pattern, logistics enterprises, and coordinated development of relevant industries.

10.1 Overview of the Belt and Road Initiative

10.1.1 Basic Contents of the Belt and Road Initiative

In March 2015, the NDRC, the Ministry of Foreign Affairs, and the Ministry of Commerce of China jointly released the *Vision and Actions to Push forward Co-building of the Silk Road Economic Belt and the 21st Maritime Silk Road* (hereinafter

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referred to as the *Vision and Actions*), a major document designed to push forward and implement the B&R Initiative.

The *Vision and Actions* points out that the co-building of the B&R is aimed at facilitating an orderly and free flow of economic factors, efficient allocation of resources and in-depth integration of markets, encouraging countries along the B&R to coordinate their economic policies and engaging in regional cooperation in a larger scope, at a higher level, and in deeper layers, and working together to build the open, tolerant, balanced and universal regional economic cooperation structure.

When developing the B&R Initiative, China adheres to the philosophy of “peace, cooperation, openness, tolerance, mutual learning, mutual benefits and win-win development”. Major contents are policy coordination, facility connectivity, financial integration, unimpeded trade, and people-to-people bond. The path of implementation is to make active use of existing bilateral and multi-lateral cooperation mechanisms, push forward practical cooperation, and build the community of shared interest, common future and responsibility, featuring mutual political trust, economic fusion and cultural tolerance.

The objectives of the B&R Initiative are: (1) Strive to improve the regional infrastructures, essentially establish the safe and efficient network of land, sea and air passages, to reach a new level of connectivity; (2) Upgrade the facilitation of investment and trade, build the free trade zone (FTZ) network with high standards, to build closer economic ties; (3) Deepen the mutual political trust, to engage in more extensive cultural exchanges. By doing so, different civilizations will learn from one another, prosper together, and the peoples of all nations will better know one another and live in peace and friendship.

To push forwards the B&R Initiative, China will take the comparative advantages of its regions, enhance the interactions and cooperation among the Eastern Region, Central Region and Western Region, and adopt the more active strategy of openness. At the same time, the openness and cooperation along the B&R need countries along the routes to endeavor together and move towards mutual benefits and common safety.

10.1.2 International Community's Positive Response to the B&R Initiative

Following the announcement of the B&R Initiative, President Xi Jinping and Premier Li Keqiang of China have successively visited tens of nations and attended several major global events such as the Dialogue on Strengthening Connectivity Partnership and the Sixth Ministerial Meeting of China-Arab States Cooperation Forum. They have had several face-to-face talks with State chiefs and governmental heads in an active effort to reach a consensus on co-building the B&R. Since the B&R Initiative was proposed, about 60 countries along the B&R have clearly expressed the intention of supporting and active participation in the construction; multiple interna-

tional organizations including the ASEAN, the EU and the LAS have also expressed support for the Initiative.

With South Asian countries actively responding to the B&R initiative, China has made tangible progress in economic and trade cooperation with many South Asian countries. China has become the major source of foreign investment in many South Asian countries and the largest source of foreign capital in some of these countries. State chiefs or government heads of more than 30 countries and regions like Russia, Italy and Sri Lanka have responded positively to the B&R Initiative. Among them, Belarus, Maldives and more than 10 other countries expressed “positive assessment” or “high agreement;” Egypt, Ukraine, Sri Lanka and other countries expressed the “willingness to actively participate.” The UK, though neither along the ancient Silk Road nor along the B&R routes, has positively proposed to gear the Northern Powerhouse proposal of the UK to the B&R strategy, and invited President Xi Jinping to visit Manchester, which shows that countries not along the B&R routes can also play an active part in the construction of the B&R.

10.1.3 Progress of the B&R Initiative

The B&R Initiative has made important progress in the past four years, with the guidance of the “Five-Pronged Approach.”¹ First, for policy coordination, China has been fully communicating with relevant countries to link the construction of the B&R to the development plans of countries along the B&R to realize complementary advantages through strategic matchmaking. Presently the following planned projects have realized matchmaking: the Eurasian Economic Union proposed by Russia, the overall ASEAN Connectivity proposed by the ASEAN, the “Bright Road” Initiative proposed by Kazakhstan, the “Middle Corridor” Initiative proposed by Turkey, the “Road of Development” proposed by Mongolia, the “Two Corridors and One Circle” proposed by Vietnam, the “Northern Powerhouse” proposed by the UK, and the “Road of Amber” proposed by Poland. The planning for matchmaking between the B&R and Laos, Cambodia, Myanmar and Hungary is also in full swing.

Second, for facility connectivity, a large number of interconnection projects have been planned and implemented. Examples include railway construction projects like the Jakarta-Bandung Hi-speed Railway,² the China-Laos Railway,³ the Ethiopia-Djibouti Railway,⁴ and the Hungary-Serbia Railway,⁵ and port projects like Gwadar Port and Piraeus Port. At present, a compound network of infrastructures is forming

¹Policy coordination, facility connectivity, financial integration, unimpeded trade and people-to-people bond.

²The high-speed railway from Jakarta and Bandung, Indonesia co-constructed by China and Indonesia.

³The express railway from Kunming, capital of Yunnan Province, China to Vientiane and Laos.

⁴The railway connecting Addis Ababa, capital of Ethiopia, and Djibouti, capital of Djibouti.

⁵The railway connecting Budapest, capital of Hungary, and Belgrade, capital of Serbia.

along the B&R. This network is guided by economic corridors such as the China-Pakistan, the China-Mongolia-Russia and the New Eurasian Continental Bridge; they take land, sea and air transport channels and information superhighways as the backbone, and relies on major projects of railways, ports and pipelines.

Third, for unimpeded trade, China has been working with participating countries of the B&R in promoting trade and investment facilitation and continuous improvement of the business environment. For 2014–2016, the total trade volume between China and countries along the B&R exceeded 3 trillion USD, and China's investment in countries along the B&R exceeded 50 billion USD. China's businesses have constructed 56 economic and trade cooperation zones in more than 20 countries.

Fourth, for financial integration, China has been organizing and carrying out multiple forms of financial cooperation with countries participating in the construction of the B&R. The Asian Infrastructure Investment Bank (AIIB) has provided nine projects in countries participating in the construction of the B&R with loans totaling 1.7 billion USD; the Silk Road Fund has invested a total of 4 billion USD; China and sixteen Central and Eastern European countries have jointly set up the "16+1" Financial Holding Company. These new financial institutions have focuses different from that of other world's traditional multilateral financial institutions, and yet are complementary to them; together they have formed a financial cooperation network of the B&R with clear hierarchy and preliminary scale.

Fifth, for people-to-people bond, countries participating in the construction of the B&R have been carrying forward the spirit of the Silk Road and engaged in the construction of projects such as to Silk Road of Innovation and Silk Road of Health Cooperation. The parties have carried out extensive cooperation in the fields of science, education, culture, health and civil exchange, which has laid a solid foundation of public opinion for the B&R construction. The Chinese Government has offered scholarships for 10,000 students in countries related to the B&R, and local governments have also set up special scholarships in relation to the Silk Road, encouraged international cultural and educational exchanges; they have held a number of cultural cooperation projects, such as the Year of Silk Road Culture, the Year of Silk Road Tourism, art festivals, film and TV bridge, seminars and think tank dialogs, etc.

10.2 Progress of the Logistics System Construction of the Belt and Road

The construction of the six major economic cooperation corridors and several maritime strategic nodes is an important part of the top-level design of the Chinese Government for the B&R Initiative. The six economic corridors, the fundamental framework for the construction of the B&R, refer to the China-Mongolia-Russia Economic Corridor, the New Eurasian Continental Bridge Economic Corridor, the China-Central Asia-West Asia Economic Corridor, the China-Indochina-Peninsula Economic Corridor, the China-Pakistan Economic Corridor, and the Bangladesh-



Fig. 10.1 Layout for the construction of the six corridors of international economic cooperation and the maritime strategic nodes

China-India-Myanmar (BCIM) Economic Corridor. The several important maritime strategic nodes refer to a group of well-operated ports along the Maritime Silk Road to be built into comprehensive support bases for integrated economic development, trade cooperation and industrial production. The layout of the six corridors of international economic cooperation and the maritime strategic nodes are shown in Fig. 10.1.

In the next phase of the development, transportation and logistics projects in the above regions will be the pivotal content to the construction of the logistics system of the B&R. China is pushing forward the implementation of these projects at both the Central Government level and the local government level. At present, construction work of the six major economic corridors and maritime strategic nodes are progressing smoothly, with the Customs clearance and cross-border logistics service system gradually instated. With the above planning and implementation, the embryonic forms of the two logistics channels of the B&R, land and sea, have been basically formed.

10.2.1 Progress of the Logistics System Construction of the Six Economic Corridors

10.2.1.1 The China-Mongolia-Russia Economic Corridor

China, Mongolia and Russia have a long history of business and trading activities. In addition to continuing the improvement on the transportation infrastructure, key tasks for the construction of the B&R include enhancing the efficiency of Customs clear-

ance, strengthening the construction of economic cooperation zones and free trade zones in the border regions, and further deepening the economic cooperation among the three countries. In June 2016, the three countries jointly signed the *Planning Outline for the Construction of the China-Mongolia-Russia Economic Corridor*, which has laid a foundation for deepening the substantive cooperation according to the framework of the China-Mongolia-Russia Economic Corridor. Presently, the three parties are refining the implementing mechanism of the *Planning Outline* and selecting the list of preferential projects.

The ongoing transport and logistics projects in the framework of the China-Mongolia-Russia Economic Corridor mainly include highway and railway projects connecting the three countries, the infrastructure at Wuliji Port between China and Mongolia; the Erenhot-Zamyn-Uud Cross-border Economic Cooperation Zone and the Manchuria Free Trade Zone have begun operation.

10.2.1.2 The New Eurasian Continental Bridge Economic Corridor

Countries along the New Eurasian Continental Bridge are highly complementary in their economies. Trains are the backbone for the land transportation along the New Eurasian Continental Bridge. Since the implementation of the B&R Initiative, China has successively launched multiple container train lines, such as the “Chongqing-Xinjiang-Europe,” the “Chengdu-Xinjiang-Europe,” the “Zhengzhou-Xinjiang-Europe,” the “Wuhan-Xinjiang-Europe,” the “Xi’an-Xinjiang-Europe,” and the “Yiwu-Xinjiang-Europe” Lines. To date, there have been three channels, the western, the central and the eastern channels, for operating the China-Europe trains. Among them, the western channel leaves China from Alashankou (Horgos), the central channel leaves China from Erenhot, and the eastern channel leaves China from Manchuria (Suifen River, or Razdolnaya). Up to the present, a total of over 1700 China Railway Express trains have been launched; in 2016 over 30,000 standard containers had been transported by land through this corridor. In addition, Phase I of the China-Kazakhstan (Lianyungang) Logistics Cooperation Base has officially begun to operate in May 2014 and the Phase II construction work is progressing steadily.

10.2.1.3 The China-Central Asia-West Asia Economic Corridor

The China-Central Asia-West Asia Economic Corridor mainly involves five Central Asian countries and Iran, Saudi Arabia, Turkey. These countries are rich in energy and mineral resources, but their infrastructures are not top-notch. Therefore, the leading projects in the construction of this corridor mainly focus on cooperative development of transportation infrastructures and oil and gas resources. In June 2016, the Angren-Pap railway of Uzbekistan officially began operation; in August 2016, the Ankara - Istanbul Hi-speed Railway that had operated safely for two years were fully transferred to the Turkish State Railways. Also in August 2016, Vakhdat-

Yovon railway of Tajikistan was completed and began operation; in December 2016, the A/B/C pipelines of China-Central Asia Natural Gas Co. began production and pipeline D was under construction.

10.2.1.4 The China-Indochina-Peninsula Economic Corridor

The China-Indochina-Peninsula Economic Corridor is the bridge linking China with the Indochina Peninsula and a transnational economic corridor between China and the ASEAN. In May 2016, the Ninth Pan-Beibu Gulf Economic Cooperation Forum and the China-Indochina Peninsula Economic Corridor Development Forum were held in Nanning, Guangxi, China. On this occasion, the China-Indochina Peninsula Economic Corridor Proposal was released, and nine projects, including the China-Indochina Cross-border Settlement Platform for E-commerce, the China-ASEAN (Qinzhou) HUAWEI Cloud Computing and Big Data Center, the Pilot Project of Longban-Trà Lĩnh Cross-border Economic Cooperation Zone, the construction project of South China Sea International Cruiser Homeport and Routes, and the Myanmar-China (Kingsanto) Agricultural Model Zone were signed. In 2016, the construction of Jakarta-Bandung Railway and China-Laos Railway was started. The construction for the dedicated freight channel connecting Mohan Port of China and Boten port of Laos was also started; China and Laos signed the “Overall Planning (Outline) for Joint Development of Mohan-Boten Economic Cooperation Zone.”

10.2.1.5 Construction Progress of the China-Pakistan Economic Corridor

Among the six economic corridors, the China-Pakistan Economic Corridor has become a model project with priority owing to the strong willingness of cooperation between the two governments; in fact, several major construction projects have gotten started. In 2016, these key infrastructure projects of the China-Pakistan Economic Corridor were pushed forward steadily with the progress shown in Table 10.1.

10.2.1.6 The Bangladesh-China-India-Myanmar Economic Corridor

The Bangladesh-China-India-Myanmar Economic Corridor is a major thoroughfare to link China closely with South Asian and Indochina countries. The construction of this economic corridor is currently behind schedule. In April 2017, the third meeting of the Joint Research Team on the BCIM Economic Corridor was held in Calcutta, India. At the meeting, the attendants discussed the research report prepared jointly by the four countries, reaching consensus in fields such as interconnectivity, energy, investment and financing, goods and service trading, as well as investment facilitation. Although the overall construction plan has not yet been clear, some

Table 10.1 Major construction projects of the China-Pakistan Economic Corridor in 2016

Category	Project
Transport infrastructure	In April 2016, the groundbreaking ceremony for the upgrading of the key project of the Karakoram Highway to Phase II was held In August 2016, the largest transport infrastructure project, the Peshawar-Karachi Expressway project, was started In November 2016, the upgrading of Pakistan's ML-1 trunk railway and the construction of Havelian port entered the early stage of exploration and testing In December 2016, the overall construction progress of Lahore Rail Transit Orange Line project reached 50%
Ports and free trade zone	In September 2016, the pilot zone of the Gwadar Port Free Zone started construction and was expected to be completed by yearend of 2017 In November 2016, the Gwadar Port was officially opened for navigation

Source Compiled from relevant data by this report

related projects in the BCIM Economic Corridor are already in progress. For example, the port construction project between China and Sri Lanka has been progressing; the oil and gas pipeline project between China and Myanmar has already started to transmit oil and gas and is being further improved; in August 2016, the overall control project of the Dali-Lincang Railway of the China-Myanmar International Railway Channel (LI) started construction; in February 2016, the Industrial Park of Kyaukpyu Special Economic Zone, a project which the CITIC consortium won the bid, started construction.

10.2.2 Construction of the Logistics System of Maritime Strategic Nodes

10.2.2.1 Important Port Nodes of the B&R in China

China's domestic ports are an important foundation for the maritime logistics channel of the B&R. In accordance with the needs for the development of the B&R, major ports in China have been enhancing their transport efficiency by improving the navigation conditions of the ports and optimizing the transport organization modes. The construction conditions of major port nodes of the B&R in China are shown in Table 10.2.

Table 10.2 Construction conditions of major port nodes of the B&R in China

Port	Conditions
Dalian Port	<p>Ocean-Rail combined transport has formed the inland network layout of “Four centers, twelve terminals and thirty-one stations”</p> <p>In 2016, cross-border transit containers reached 18 thousand TEUs</p> <p>In August 2016, China opened its first cross-border train for cold-storage containers to Moscow</p> <p>Customs supervision center of multimodal transport at Dalian port achieves 24-hours rapid Customs clearance and inspection for cross-border transit trains</p> <p>Integrating shipping, port operations, rail transit and real-time information, and providing online real-time information query throughout the transport process</p>
Tianjin Port	<p>Operated 120 container liner routes, more than 550 voyages per month</p> <p>Actively promoted the construction of the “Tianjin-Mongolia-Russia” and the “Tianjin-Xinjiang-Europe” major logistics channels; pioneered the establishment of five regional marketing centers and twenty-five “waterless ports” in China’s hinterland; launched over 10 ocean-rail combined transit channels</p>
Zhoushan Port	<p>Developed the two-way business model of sea and land transportation. On the one hand, developed maritime branches and cooperated with surrounding ports like Jiaying, Taizhou, Wenzhou and Yiwu to realize offshore transshipment, and on the other hand, expanded towards inland hinterland</p>
Ports in Fujian Province	<p>Completed 144 deep-water berths with the capacity of over 10,000 tons and launched 325 container routes</p> <p>Xiamen, Fuzhou and Meizhou Bay entered the list of 100-million-ton ports and made new progress in cooperation with the ASEAN ports</p> <p>Launched new routes of alliance operation, with the route network connecting to countries in Europe, the Middle East, North Africa and Southeast Asia, as well as western coast of the US</p> <p>The port cluster of Fujian Pilot Free Trade Zone achieved high-end shipping service functions such as domestic and international transit, ocean-rail combined transportation, LCL, distribution, procurement, and transit trading</p> <p>Completed the Xiamen Southeast International Shipping Center and the international cruise homeport; had over 100 routes from coastal ports of Fujian to countries along the 21st Maritime Silk Road, as well as Hong Kong and Taiwan</p>
Beibu Gulf	<p>Established maritime transport communications with 47 ports in seven ASEAN countries, launched 29 foreign trade routes and realized coverage of all major ports of the ASEAN</p> <p>In 2016, the throughput of the Beibu Gulf Port increased steadily, and the total throughput of Qinzhou Port, Fangcheng Port and Beihai Port reached 140 million tons, a YOY growth of 9.02% and the container throughput was increased by 26.85%</p>

Source Compiled from relevant data by this report

10.2.2.2 Important Port Nodes of the B&R Outside China

Developing crucial node ports along the B&R has significant meaning for the optimization of the operational pattern of regional logistics systems and the diversification of the choices of transport modes. Cooperation of the ports is an essential way for China to strengthen the economic and trade exchanges with countries along the B&R. The modes of cooperation include providing assistance to the construction of port terminals, undertaking port construction projects, acquiring port management rights, jointly constructing ports and supporting facilities with countries where the ports are located, as well as developing international free trade zones, economic development zones and industrial zones behind the ports.

China has now involved in the development and construction of multiple ports along the B&R. Among them, the port cluster in Malaysia of South Asia, the Colombo Port of Sri Lanka in South Asia, the Gwadar Port of Pakistan in West Asia, and the Djibouti Port in East Africa are important nodes for China's construction of the 21st Maritime Silk Road. China's involvement in the construction projects of major foreign ports along the B&R is shown in Table 10.3.

10.2.3 Customs Clearance and Cross-Border Logistics Service System

In addition to infrastructure construction, Customs clearance and cross-border logistics service system are also essential content for the logistics system construction of the B&R. In the context of a new round of reform and opening-up, many provinces and cities in China have put forward development ideas of building new open platforms in accordance with their own advantages. And construction of the cross-border logistics service system is a crucial part for the construction of open platforms in areas related to the B&R. Among them, enhancing the Customs clearance capability is the key to the construction of the cross-border logistics service system of the B&R at the present time.

10.2.3.1 Logistics Service Systems on the Outward-Open Platforms

Open economy is an essential measure to expand the new growth in various regions of China. Since the proposal of the B&R Initiative, a number of regions in China have put forward the development ideas for further opening-up in accordance with their own advantages. In regions related to the B&R, most of the opening-up measures entail in cross-border logistics services.

China Railway Express represents a milestone achievement in promoting the construction of the B&R for various regions of China. Since the official launching of the "Suzhou-Manchuria-Europe" train of the China Railway Express via Manchuria

Table 10.3 Key port construction projects along the B&R with China's participation

Port	Major projects	Strategic significance
Djibouti	The first overseas logistics support facility of China has started construction Participation in the expansion of the Doraleh Multipurposes Port and the construction of the new airport of Djibouti. The Djibouti International Free Trade Zone was initially completed by the end of 2017	Important fulcrum for the B&R Initiative to radiate to the African Continent
Gwadar	Gwadar Port has been officially opened Surrounding power plants, water plants, expressways, railway hubs, industrial parks and other ancillary facilities are being built	An important part of the China-Pakistan Economic Corridor and a key node of the B&R
Sri Lanka	Colombo Port City project is in progress Phase II of Hambantota Port, large transshipment port and port vicinity industry behind the port are in progress China Merchants Port Holdings Company Limited will acquire part of the equity of Hambantota Port, and will jointly develop an industrial park with Sri Lanka in the same area	Meeting the need of Colombo as a hub of transshipment Solving the problem of transshipment of the 21st Maritime Silk Road in South Asia
Malaysia	Formed the "Port Alliance" with China, with ten ports of China cooperating with six ports of Malaysia, namely, Pelabuhan Klang, Malacca, Penang, Johore, Kuantan and Bintulu Planning to jointly build a third port of Bandaraya Klang at Carey Island	Reducing customs barriers and promoting trade and tourism cooperation

Source Compiled from relevant data by this report

Port in March 2014, China has launched three operational channels of China Railway Express—the eastern, central and western channels. The eastern channel leaves China from Manchuria (Suifen River, or Razdolnaya), the central channel leaves China from Erenhot and the western channel leaves China from Alashankou (or Horgos); these three channels lead to eleven cities in seven European countries. Nearly 20 cities in China have launched China Railway Express, including cities such as Chongqing, Zhengzhou, Chengdu, Wuhan, Suzhou, Yiwu, and Harbin, which as a whole can essentially radiate to the whole country.

At present, Shandong, Jiangsu, Hubei and other provinces of China with strong industrial foundation are actively promoting their businesses to “go abroad.” Through measures such as encouraging logistics companies to invest in mergers and acquisitions of overseas logistics projects and exploring localized logistics services in overseas countries are conducive to the formation of cross-border logistics service systems for international cooperation in productive capacity. For example, Shandong is actively guiding its large commercial logistics companies to build overseas commercial and trade logistics parks in Central Asia, West Asia and Central and Eastern Europe.

10.2.3.2 Reform of Customs Clearance Integration

China’s Customs clearance mode is evolving from regional integration to national integration. Since 2014, integration of Customs clearance has been achieved among five sections of the Beijing-Tianjin-Hebei area, the Yangtze River Economic Belt, Guangdong Province, Northeast China and the Silk Road Economic Belt. In October 2015, Guangdong, Guangxi, Fujian and Hainan provinces signed the *MOU on In-depth Promotion of the Cooperation in the Integration of Inspection, Quarantine and Customs Clearance in the Pan Pearl River Delta* with the purpose of strengthening the cooperation among portal inspection and quarantine agencies in the Pan Pearl River Delta and the B&R. In December 2015, Henan Province fully implemented the cooperative mode for Customs clearance and inspection of “Once-for-all declaration, Once-for-all inspection and Once-for-all release” to consummate the “One-stop” Customs clearance service system with e-portal of Henan as the carrier. By this it accomplished the regional cooperation of Customs clearance with provinces along the B&R, the Yangtze River Economic Belt, the Beijing- Tianjin-Hebei area, the Pan Pearl River Delta and Northeast China. With further progress in the reform of regional integration of Customs clearance, nationwide integration of Customs clearance will be an important goal for China’s Customs reform.

In the meantime, China is also reinforcing Customs-related cooperation with countries along the B&R, which mainly includes improving the Customs clearance conditions of border portals, reducing Customs clearance costs, and striving to realize exchange of information, mutual recognition of supervision and mutual assistance in law enforcement among the Customs offices.

10.3 Impact of the B&R on the Development of China's Logistics Market

10.3.1 Policies Will Promote the Integration and Transformation of China's Logistics Market

For a long time, the logistics industry in China has been hampered by issues such as small scale and scattered operations, and thus has difficulty in achieving resource integration and win-win cooperation. In order to better serve the B&R, China's Central Government and local governments have issued a number of policies and measures to promote the integration and upgrading of the logistics industry.

At the Central level, in 2014, the State Council promulgated the *Medium and Long-Term Plan for the Development of the Logistics Industry (2014–2020)*, requiring the relevant parties to “accelerate the development of public information platforms for transportation and logistics;” and proposing twelve key projects including multi-modal transport, e-commerce logistics and logistics standardization. It also pointed to the in-depth integration of the Internet of Things, cloud computing, mobile Internet and other new-generation information technologies with the logistics industry to continually promote the transformation to intelligent logistics and the upgrading of logistics services. The National Development and Reform Commission, the Ministry of Commerce, the Ministry of Finance, the State Administration of Taxation, and the Ministry of Transport have also launched a number of key policies in terms of transport infrastructure, logistics standardization, value-added tax deduction, transport equipment and technology, informatization, and modern transport organization to fully support the construction of the logistics system for the B&R. China Railway Corporation has been actively coordinating container trains from China to Europe and launched the unified brand of China Railway Express in June 2016 to optimize train scheduling according to the principle of “Six Unified Ways.”⁶

At the domestic level, many provinces have responded positively to the B&R Initiative and joined the construction of the logistics system of the B&R. Examples include: (1) Heilongjiang Province has sped up the construction of the Eastern Logistics Passage of China-Russia Railway; (2) Jiangxi Province has launched the *Work Plan on Further Promotion of the Logistics Passage of Jiangxi-Europe (Asia) International Railway* to promote the establishment of a cross-regional cooperation mechanism of logistics and tidied up the Jiangxi-Europe (Asia) International Railway Logistics Passage; (3) The Xinzheng Comprehensive Bonded Zone of Zhengzhou has achieved integration of Customs clearance with nine Customs offices and eleven inspection offices in China and made a series of cooperation agreements with countries along the B&R; (4) Fujian Province is aggressively developing ocean-railway

⁶The “Six Unified Ways” imply “unified brand logo, unified transport organization, unified whole-journey pricing, unified service standard, unified management team, and unified coordination platform.”

combined transport, and has launched the first special train under “SSTL”⁷ in December 2016; (5) Xinjiang Province has established bilateral cooperation agreements with Kazakhstan, Kyrgyzstan, Tadjikistan, Pakistan and Mongolia in international highway transport and launched 107 international passenger and cargo transport routes.

10.3.2 The B&R Initiative Will Reshape the Pattern of China’s Logistics Market

Traditionally, the pattern of China’s logistics market is mainly from west to east and from north to south for logistics of basically-processed products, and from east to west and from south to north for logistics of finely-processed products. With the increased level of openness, China has become the largest trading partner, largest export market and major source of investment for many countries along the B&R. Following the deeper implementation of the B&R Initiative, the establishment of new domestic and international logistics channels will break the traditional industrial pattern; the freight volume and freight turnover in China’s western border areas will notably increase, and China’s Central region will become a transit point or industrial cluster for bi-directional logistics activities between the East and the West. This will have a significant impact on the spatial pattern of China’s logistics market.

10.3.3 Interconnection of the B&R Will Greatly Expand the Development Sphere of China’s Logistics Enterprises

10.3.3.1 Infrastructure Construction Projects Will Become a New Growth Engine for China’s Construction Logistics Market

The development and construction for interconnection infrastructure projects of the B&R needs a large number of cross-border logistics projects originated from China to the project destinations. Since these overseas projects often require local logistics services, they have provided China’s logistics companies with opportunities for international development.

Highway, railway, port and electric power infrastructures have always been the strong suit of China’s contractors of foreign projects. Such projects in countries along the B&R have become a new growth engine for China’s construction logistics market. China’s national enterprises, with abundant manpower, materials and financial resources, can lay the groundwork for more logistics enterprises to “go

⁷“SSTL” program, “Secure and Smart Trade Line” Pilot Program is the world’s first international cooperation program fully implementing the *Framework of Standards to Secure and Facilitate Global Trade*.

abroad.” At present time, China’s national enterprises are already involved in a number of infrastructure construction projects of highways, railways, bridges and dams in countries along the B&R. These enterprises mainly include China Communications Construction Group, Power Construction Corporation of China, China Railway Material Group, China Railway Group Limited, China Railway Construction Corporation, China State Construction Engineering, and China Railway Signal & Communication Corp.

10.3.3.2 The “Shekou Model 4.0” Has Been a Great Opportunity for Logistics Enterprises to “Go Abroad”

At present time, Djibouti, Colombo and Gwadar ports are all developing following the “Shekou Model 4.0,”⁸ which will be promulgated in more port nodes along the 21st Maritime Silk Road. The continuous improvement of the economic functions of port nodes will open up new market space for China’s logistics companies to “go abroad.”

For example, the Gwadar Port Free Zone will be built into an economic complex of “port + park + city.” After completion, the Gwadar Port Free Zone will not only play a simple port role in transporting, but will form a cluster integrating industrial parks and industries having trade, logistics and finance functions. The Gwadar Port Free Zone is intended to be built into an international trade and logistics center of Pakistan, and a platform for industrial linkage between China and Pakistan.

10.3.3.3 Numerous Overseas Logistics Projects Will Advance the Internationalization and Specialization of China’s Logistics Companies

With the promotion of construction projects for the B&R interconnection and the improvement of logistics systems, international logistics in the impacted regions is expected to usher in new development opportunities. The participation of a large number of overseas logistics projects will accelerate the development of China’s logistics enterprises towards internationalization and specialization. China’s logistics enterprises going abroad may beget multiple international logistics groups with strong competitiveness and large market share.

⁸The development model of Shekou Industrial Zone adopted by China Merchants bureau. The main content is synchronous development of the port in the front, the central zone and the city behind, with the harbor port as the leader, the port-vicinity industrial parks as the core and the main carrier. The frontal port, the middle park and the city behind developed synchronously is known as the “Shekou Model 4.0”. The physical tasks include constructing first-class port facilities, smoothing the transportation channels between the port and the hinterland, developing industrial parks, logistics parks and free trade areas, and constructing commercial facilities and living facilities required for industrial development. The systemic tasks include Customs clearance, settlement, payment, logistics, training and other services.

Table 10.4 Major projects with participation of China's Representative Logistics Enterprises during the construction of the B&R

Company	Main achievements
China Merchants Group	Founded the "Silk Road Station" in Djibouti, the first overseas project of the "Shekou Model" Built the infrastructure of China-Belarus Industrial Park and Phase I of China-Belarus Commerce & Logistics Park Comprehensively promoted the cooperation with Togo and developed the overseas market by integrating the "China experience" Set up the Comprehensive Logistics Department and integrated logistics resources with Sinotrans CSC Holds forty-six ports in eighteen countries and regions of the world, with container throughput of ports ranking second in the world
China COSCO Shipping Corporation Limited	In March 2016, China COSCO signed a 27-year transport agreement with Vale S.A. In March 2016, COSCO signed an investment cooperation agreement for large container terminal with PSA Singapore Increased the number of container terminals of COSCO Pacific Ltd. to thirty-nine, with the terminal network spreading across the world

Source Compiled from relevant data by the report

China Merchants Group and China COSCO Shipping Corporation Limited are representative enterprises of China that have invested in many overseas logistics projects during the construction of the B&R logistics system. These two national enterprises have played an important role in the improvement of the maritime strategic fulcrums and logistics channels for the B&R. Major projects they participated in are as shown in Table 10.4.

10.3.4 The B&R Construction Will Promote Coordinated Development of China's Logistics Industry with Related Industries

The B&R will firstly promote the development of energy logistics and resources logistics. Countries along the B&R and China are highly complementary in resources. For example, oil and gas of Central Asian countries, nickel and iron of Indonesia and the Philippines, bauxite and iron of Vietnam as well as sylvite of Thailand and Laos are all bulk mineral products which China needs to import. The B&R will

strengthen the interconnection and cooperation in energy infrastructures for all parties to jointly maintain the safety of pipelines for the transmission of oil and accelerate the development of energy and resource logistics between China and countries along the B&R.

The B&R will promote free flow of economic factors and bring opportunities for the development of manufacturing logistics. Countries along the B&R are important markets for China to export railway, high-end nuclear power equipment and other advantageous capacities in industries such as iron and steel, nonferrous metals, building materials and textile. The overseas industrial chain of these sectors will deepen the cooperation between China and neighboring countries in the manufacturing sector and promote the coordinated development of the manufacturing and logistics industries.

The B&R will also accelerate the development of e-commerce. At present, cross-border e-commerce activities are becoming increasingly frequent and active, thus putting forward higher requirements on systems capabilities for cross-border e-commerce logistics. Establishment of the B&R has brought tremendous development opportunities for cross-border e-commerce logistics.

10.4 Summary

By 2016, it has been four years since the Chinese Government proposed the B&R Initiative. The Initiative has received positive response from the international community during this period, and by 2016 over one hundred countries and organizations have participated in the construction of the B&R. At present, the logistics infrastructures and services are the main contents of the construction of the B&R as promoted by the Chinese Government. According to the Government's top-level design of the B&R, the present focus for promoting the construction of the B&R are on the six economic cooperation corridors and several major maritime nodes. By the end of 2016, the above projects had progressed smoothly, and the embryonic forms of the two logistics channels of the B&R had been basically established. With the gradual consummation of the transport and logistics infrastructures, the economic and trade activities of the countries along the B&R are becoming increasingly active, and the logistics market is also rapidly taking shape. In general, due to the significance of the B&R Initiative in China's future economic and social development, the construction of the B&R logistics system will likewise have profound impact on the development of China's logistics market.