

UDC 339

TRANSPORTATION INFRASTRUCTURE IN CHINA

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Abstract. China plays a crucial role in the global economy representing one of the key centers for international trade and logistics. In the past two decades, the country has significantly developed its transportation system, including motor, rail, air, and water ways and pipelines. The major logistics terminals, logistics parks, and warehousing facilities have been built to enable domestic and global commerce. The prime development areas are located around the largest Chinese seaports. However, the current state of logistics infrastructure is still insufficient to provide value added services in many areas across the country. The current research examines logistics infrastructure in China across its advantages, disadvantages, and perspectives.

Keywords: logistics infrastructure; transportation system; transportation infrastructure; logistics terminals; logistics parks; seaports; warehousing; 3PLs; global logistics.

Over the past twenty years, China has become the second-largest global economy after the United States, an emerging big power, and one of the key centers for international trade and logistics. Even though China's economic growth has slowed down in 2014–2015 finally hitting a 25-year low in January, 2016 and sending shocking waves across the globe, the country has been maintaining a strategic focus on innovative development of the logistics infrastructure and stability overall. According to the National Bureau of Statistics of China (2016), despite a decrease in imports (13.2 %) and exports (1.8 %), China holds a surplus trade balance in 2015. Income per capita shows a steady growth of 7.4 %. Chinese middle class is growing as well as consumption. The retail sales of consumer goods

rose by 10.6 %; the online retail demonstrated a boost of 33 %. To facilitate the emerging market, the national strategy specifies logistics infrastructure development among the priorities. In 2015, investments in fixed assets for storage, post, and transportation rose by 14 % [10]. The current research purposes to examine logistics infrastructure in China from domestic and international perspective. The prime discussion concerns Chinese transportation system, logistics terminals, and warehousing facilities that enable domestic and global commerce.

China's motor transportation system has public and toll roads. Despite the rapid expansion, the roads' capacity is still insufficient with routes concentrated in the developed coastal areas and inland cities in close proximity to the major rivers. Total length of na-

tional expressway systems in China is 70,000 miles versus 64,000 miles in the USA. China's freight trucking industry accounts for \$86B in revenues in 2015. With annual growth of 12.3 % in the last five years and over 62,500 companies, the industry can be considered fragmented, immature, and unbalanced. Modernly equipped and logistically advanced for hire trucking companies inside the ports and special industrial parks contrast with ones that operate outside these zones. Often, a company, which functions outside the ports, possesses the only truck and competes with the similar ones on the low-cost delivery basis. Small freight companies rely on a network of agency relationships and participate in the bidding process to win a delivery order. It is common to see tricycle carts that move cargo from manufacturing sites to airports in the third tier cities. Foreign corporations and global 3pls, as UPS, FedEx, and DHL, operate their private fleet to secure reliable and effective freight service within the country [1; 2; 6]. Even though investments in road infrastructure and fleet are significant, e-commerce growth requires much more capacity than the current and projected motor transportation infrastructure and requires integration of rural areas.

In 2007, China did not have high speed railways. However, today, the country accounts for over 10,000 kilometers of track and has the world's largest high speed network. According to Reuters, by 2020, the Chinese government plans to execute the construction of standard railways to connect cities with more than 200,000 residents and high-speed railways to con-

nect cities with more than 500,000 residents (2014). The plan is to have 25,000 km of high speed rails track available, including passenger and freight carriage lines. In 2015, China rail freights volumes were 3.4 billion tones. In order to decrease costs of transportation while expanding to Europe, China executes construction of several railroads across the continent. In November 2014, the first train left China's Zhejiang province, the world's largest wholesale hub for small consumer goods, towards Madrid, Spain. Compared to the ocean mode, the transit time was reduced in half. The costs of railway transportation are also competitive. The major problem with railways concerns security as several accidents occurred in the past years. China needs to focus on developing a safer and more reliable high speed tracks in order to move freight internationally by railroads.

In 2013, China had become the world's largest trading nation. The volume of international trade between China and other countries has significantly increased. Water routes, both the inland and the ocean, play a crucial role not only for the China's development but also for the rest of the world. The lives of over seven billion people are connected to this part of the world, and every country dreams of having a growth rate and logistics opportunities of that in China. China's government strategy includes efficiency of water transport logistics as its priority. The country plans a major expansion of port facilities by 2020 aiming the over a hundred percent growth in capacity of container terminals compared to the current level as 90 % of all merchan-

dise is transported by the ocean. China's major ports are located in Shanghai, Dalian, Dandong, Fuzhou, Guangzhou, Haikou, and Tianjin. Shanghai is number one of the top world container ports. Over 500 million tons of raw materials arrive in Shanghai only every year by sea: supplies of crude steel, coal, wood, and other scarce minerals. In the port zones of the major cities in the North China, factories convert raw materials into consumer goods, as furniture, paper products, and electronics, and manufacturing products, as steel and auto parts, perform assembly, and pack all products to deliver across the world by sea [1]. China Ocean Shipping Company (COSCO) is one of the largest enterprises in the world. The company owns eight vessels with 400 million tons in carrying capacity and operates various logistics facilities, including consolidation centers, storages (over 2.5 million square meters), warehouses (over 3 million square meters), shipyards, repairing workshops, and other engineering constrictions. The company has over 4,000 logistics vehicles and a giant cargo vehicle with 289 axes to deliver advanced services to their clients [4].

Inland water transportation is critical for China's entire transportation network due to the country's geography and its population location. China has two main rivers – the Yangtze River to the south and the Yellow river in the north – that link together many of the country's major cities. The primary sector of China's economy served by the inland water transportation includes but not limited to mining, forestry, and farming. Also, the water ways have high efficiency to carry large volumes

of bulk cargo from the rural areas to processing plants located in the major cities. Advantages of the inland water transportation comprise efficiency, capacity, and environmental friendliness compared to the rail or road transportation. Moreover, many producers of raw materials in China are located in river deltas where no road or railway transportation alternative is available. The demand for the inland water transportation in China has remained substantial for the last two decades. Moreover, Chinese government has implemented a plan developed to increase water transportation efficiency by expanding canals, deepening rivers, and modernizing fleet [12].

The major obstacle that challenges further expansion of water infrastructure refers to China's water problem. Due to decades of rainfall decline, prolonged droughts, excessive population growth, and wide industrial expansion, several rivers in China have dried and even disappeared. In order to continue its industrialization, the country has started to divert billions of tons of water from the Yangtze River to the Yellow River since 2014. The South to North Project is the largest water transfer project ever conducted. The goal is to divert almost 50 billion cubic meters of water every year, which is more than the River Thames has. The overall distance is almost 3,000 miles, about the distance between the East and the West coast of the U.S. [8; 12]. After several years of aggressive infrastructure investments, China has not solved the water problem yet. It slows down the inland water transportation as the entire logistics infrastructure development in China.

Air transportation is advantages because of high speed. The air transit time from China to Europe varies by hours and days, whereas other modes measure time in weeks and even months. With development of e-commerce, the role of air transportation has grown significantly. China plays a leading role in this field as the seller and the consumer. The largest cargo airlines today include Air China Cargo, China Cargo Airlines, and China Southern Cargo. In 2014, China's cargo and mail turnover reached a year-on-year increase of 8.8 %. The air carriers are expanding by adding routes and planes. In the early 1990's, China had only 94 airports, whereas in 2014, China had over 202 airports. The plan is to add over 100 airports in the next decade. The most popular airports comprise Beijing Capital International airport, Guangzhou Baiyun International Airport, Shanghai Pudong International Airport, Shanghai Hongqiao International Airport, and Chengdu Shuangliu International Airport. In 2014, the total air cargo volume grew by 4.9 % and reached an overall of 12.58 million tons. Beijing, Shanghai, and Guangzhou airports handled over a half of the total air cargo. The Shanghai Pudong International Airport plans to provide a more valuable and unique services by building a temperature controlled terminal to carry pharmaceuticals and other perishable goods [5].

Pipeline infrastructure is strategically critical for China since it supplies important energy resources as oil and natural gas, refined products, and fresh water to people and the entire manufacturing system. Originally, Chinese

were the first to utilize bamboo as a pipe. Today, China has a wide net of pipelines and maintenance facilities to transport oil and gas. The oil and gas pipeline infrastructure belongs to the major national, state-owned companies as China National Petroleum Company, Sinopec, and National Offshore Oil Corporation. Internationally, the country changed its prime role of exporter to importer as it accumulated the manufacturing power. The leading international projects in the industry involve Russia, Central Asia, Middle East, and Myanmar. Power of Siberia natural gas pipeline is planned to be fully operational by 2018 to supply 38 billion cubic meters of gas annually. In collaboration with Iran and Pakistan in the Middle East, China builds the oil pipeline. In 2015, Myanmar oil link was launched to bypass Malacca, the most recent cradle of pirates who attack the oil tankers. In addition, China has a wide net of pipelines for chemicals and refined products to utilize cost benefits of economies of scale. Moreover, due to increased manufacturing needs in water and drying rivers, the most recent pipeline project refers to the undersea water pipeline that is planned to supply fresh water from Taiwan to China: 15,000 tons of water per day with a gradual increase to 34,000 tons per day by 2027 [7; 11].

The current state of logistics and warehousing industry in China can be considered its "Achilles' heel" providing great opportunities to develop and representing a great challenge for all countries and companies involved. The key factor that drives the future of logistics infrastructure development in China is growth in cross-border e-

commerce, both inbound and outbound, which is expected to account one fifth of the country's foreign trade in 2016 correspondingly increasing demand for transportation and warehousing services [10]. Moreover, China has been acquiring foreign companies at an unmatched rate [3; 9]. The most recent announcements include (a) a complete purchase of GE Appliance Division, an American icon among home appliances and a business unit with over 11,500 employees located in the U.S.; (b) a purchase proposal to Terex Corporation, a global manufacturer of heavy equipment for various industries with headquarters in Westport, CT; (c) a purchase of a major stake in Hollywood's Legendary Entertainment; (d) a definitive agreement to acquire the Chicago Stock Exchange; and (e) a bid for Syngenta, a Swiss giant corporation. With the growing number of cross-border acquisitions and trade, China's critical role in the global trade and the global logistics infrastructure is expected to increase furthermore.

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