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**Logistics challenges for China:
drivers of the logistics industry
growth, and bottlenecks
constraining development**

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ABSTRACT: In the last two decades, the Chinese economy has witnessed extraordinary growth. China is not only the world's manufacturing centre and major market, but also an engine for the world's economic growth. Within this context, China's transport and logistics industry, as the lifeblood of its economic growth, is attracting increasing attention from industry practitioners and researchers. Given the importance of this sector, understanding industry developments and likely trends over the next few years is a valuable exercise, highlighting the key factors driving such growth, as well as the bottlenecks challenging the transport and logistics industry. This paper reviews the current status of the Chinese transport and logistics industry, analyses industry trends and potential factors driving the industry's ongoing development including the challenges obstructing growth. China's extraordinary economic growth, particularly the emerging e-commerce market in China, exposes a number of weaknesses that the Chinese logistics industry is currently not well prepared to adapt to.

KEY WORDS: *Chinese economy, logistics, transport, bottlenecks, growth prospects*

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Introduction

In the last two decades, China's economy has shown extraordinary growth. China's transport and logistics industry as the lifeblood of its economic growth is attracting increasing attention from industry practitioners and researchers. Interest is in the economic health of the transport and logistics industry, industry trends, and the nature and extent of bottlenecks constraining the industry's development?

To address these questions, we begin with a review of recent developments China's transport and logistics industry, followed by an analysis on the expected trends and the drivers accelerating growth. We then discuss some key bottlenecks constraining China's transport and logistics industry development, followed by some conclusions.

1. Recent developments in China's Transport and Logistics Industry

China's gross domestic product (GDP) experienced an average 10 percent annual growth rate between 1980 and 2012. According to the National Bureau of Statistics of China (2013), China's GDP has risen from RMB ¥362.4 billion in 1978 to RMB ¥51, 894 billion in 2012 (equivalent to 2012 USD \$8229 billion). Even as the global economy was affected and slowly recovered from the financial crisis, China's economy still grew steadily and surpassed that of Japan in 2010, becoming the world's second largest economy in terms of nominal GDP (China Second in Line 2010).

The transportation and logistics industry in China has also witnessed rapid growth. According to statistics of the National Development and Reform Commission, the National Bureau of Statistics of China, and the China Logistics and Purchasing Association, during the 10th Five-Year Plan period, the total amount of logistics cost reached RMB 158.7 trillion, an increase of 1.4 times compared to the 9th Five-Year Plan period, and the total amount of social logistics experienced an average annual growth rate of 23 percent in the same period (ResearchInChina 2006). In 2011, China's external logistic costs totalled RMB8.4 trillion, accounting for 17.8 percent of GDP (EconomicsWeek 2010). Of this cost, transportation fees, warehousing charges and logistics management fees accounted for 55 percent, 33 percent and 12 percent, respectively (BusinessWire 2012). Further, during the implementation of the country's 11th Five-Year Plan (2006-2010), China significantly invested and

improved its logistics infrastructure, including improvements on highways, railways, and other transportation facilities. The trend and development of various sectors in China is summarized below.

Road transport. Road haulage still dominates the country's freight transport mix, accounting for 76.5 percent of the total freight carried internally in 2009 (Business Monitor International (BMI) 2012). China's road-transport network is being gradually improving, particularly in the country's second- and third-tier cities. Towns with highways account for 99.24 percent of all towns, and 92.86 percent of total villages countrywide having access to highways (FDI 2009). Although the highway system in central and western China still requires significant extension and improvement, road freight rates in the west have increased to more than 710 billion tons per kilometre in 2008, which is 4.5 times greater than in 2000 (Lu 2010). However, China's trucking industry is still in a relative early stage of development despite being heavily utilised. The number of road transport enterprises was estimated to be 790,000 in 2012 and there are more than 7,500 express delivery firms in China. However, the top 20 road transport enterprises occupy less than 2 percent of the market share. Furthermore, these road freight enterprises have to suffer high costs due to excessive highway tolls and price hikes in fuel and labour, with road tolls accounting for one-third of transport costs in China (Orchard 2014).

Rail transport. China has the longest railway network in Asia and the second-largest rail network in the world after the US, with a total length of 99,000 kms of track in 2011 (Qu and Sun 2012). This number is expected to increase with further projects underway to connect containerised box shipments from China to Europe via rail. Although rail freight only accounts for 11.9 percent of the total freight shipped (Business Monitor International (BMI) 2012), rail is playing a critical role in the growth of the country's logistics industry, particularly as part of multimodal transportation in China. In the first half of 2011, total goods transported by rail in China increased to 1.94 billion tons with an eight percent year-on-year increase (Bullock, Sondhi and Amos 2009; Business Monitor International (BMI) 2012). The Chinese government is undertaking more supportive policies and implementing positive measures to develop rail transport.

Inland waterway system. China's 123,000 km of navigable distances provides the world's largest inland waterway network. China's inland waterway system has developed rapidly since 2000, with an annual average increase of over 10 percent in tonne-kms (Paul et al. 2009). China's inland waterways, just behind the rail transport network, accounted for 11.5 percent of the total freight movement in 2009. Manufacturing moving west and new Yangtze River Port utilisation makes China's inland

waterway system increasingly important in the country's freight transport network, as an economically and environmentally sound alternative to road haulage (Business Monitor International (BMI) 2012). Recognising the benefits of high-energy efficiency, low carbon emissions and the real possibility of decreasing the full utilisation rate of China's road freight, the Ministry of Transport is seeking a strategy to efficiently use China's inland waterway transportation and realise its full potential role in the country's multimodal transportation system.

Maritime. China's maritime sector has been significantly developed with more than \$357 billion Yuan invested in the sector during the last Five-Year Plan. By the end of 2008, there were 413 ports in China, 36 of which have an annual handling capacity of 10 million plus tons (FDI 2009). The port of Shanghai became the largest container port in the world in terms of its throughput in 2010 (BMI 2011).

Air freight. Air freight accounts for only a small proportion of China's freight transport mix, though it is developing steadily and growing year after year. In 2010, China had 502 airports, of which 88 percent have paved runways (Business Monitor International (BMI) 2012).

Forwarding, brokerage and warehousing. China's forwarding, brokerage and warehousing services are enjoying sustained growth. They are developing and providing more customised supply chain (SC) solutions for international customers. Warehousing and 3PLs have become a critical component of SC in China. Improving warehouse efficiency, capacity and service quality is a high priority. The low efficiency of warehousing operations is a major weakness in Chinese SC systems. Roughly 40 percent of all warehousing in China still involves manual processes (Witt, 2006). According to a recent survey in China, about half of the survey respondents reported they had to hold more than one month of inventory due to the poor warehousing and inventory management in China (Fung Business Intelligence Centre 2013). It is imperative that improvements to the efficiency of warehousing in China be made, requiring investment in lift trucks, RFID, GPS, and warehouse management expertise (Carr and Bowman 2010).

China's express services. Benefiting from the explosive growth of the e-commerce market size, Chinese express delivery services have enjoyed significant growth. From 2006 to 2013, China's express delivery business volume increased at an average annual growth rate of 36 percent, and its operating income was quadrupled at an average annual growth rate of 25.6 percent. In 2013, China's express delivery business volume was 9.2 billion pieces, ranked second in the world after the US, and its operating income reached RMB ¥ 144.2 billion. Remarkably, its business volume reached the one-

billion-units mark in the single month of November 2013 (Development & Research Center of The State Post Bureau / Deloitte 2014). However, China's express delivery services are still in the developing phase and facing problems such as poor integration of the service network, low-end service orientation, tardiness, theft, damage, lack of quality talent and advanced technology (EURObiz 2012; Huo and Hong 2013).

2. Drivers for a Steady and Robust Growth in China's Transport and Logistics Industry

Given China's extraordinary economic growth, a steady and robust growth in China's transport and logistics industry is expected to continue in the coming years. The following data demonstrates this growing trend:

The logistics demand coefficient, the logistics industry's value-to-GDP ratio, increased from 3.0 to 3.4 between 2008 and 2012; total value-added of the logistics industry, which reflects the size of the market, recorded an yoy increase of 9.1 percent at the value of ¥ 3500 billion RMB in 2012 (China Federation of Logistics and Purchasing);

The China Federation of Logistics and Purchasing (CFLP) established the China Logistics Prosperity Index (LPI) in March 2013. An LPI reading above 50 indicates overall expansion in the logistics sector. The LPI was 53 in March 2014 and remained in the expansionary range for three consecutive months. In addition, the business volume index in LPI was increased from 55.2 in January 2014 to 57.7 in April 2014, which implies a moderate increase in demand for logistics services. The investment in fixed asset index in LPI was 50.6 in April 2014, suggesting that logistics enterprises are increasing their investment in fixed assets; and the business expectations index came in at 61.7 in April 2014, indicating that managers in the logistics industry have an optimistic business expectation for industry growth (see Table 1) (The Fung Business Intelligence Centre 2014).

Table 1: China logistics prosperity index, LPI (January-April, 2014)

| LPI and Sub-indexes (2014) | January | February | March | April | Direction |
|-----------------------------------|----------------|-----------------|--------------|--------------|------------------|
| LPI | 51.50 | 51.90 | 53.00 | | Expanding |
| Business volume | 55.20 | 55.50 | 55.80 | 57.70 | Expanding |
| New orders | 51.80 | 52.20 | 53.00 | 55.40 | Expanding |
| Average inventory | 51.50 | 52.20 | 51.70 | 56.10 | Expanding |
| Inventory turnover | 52.30 | 52.80 | 53.00 | 49.40 | Decelerating |
| Cash flow | 52.30 | 52.40 | 52.70 | 47.60 | Decelerating |

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|-----------------------------------|-------|-------|-------|-------|------------|
| Capacity utilisation | 50.00 | 50.40 | 51.90 | 55.40 | Rising |
| Logistics services charges | 52.10 | 52.50 | 52.70 | 49.50 | Falling |
| Operating profit | 52.10 | 51.70 | 52.00 | 52.10 | Rising |
| Operating cost | 60.20 | 58.80 | 58.50 | 55.60 | Rising |
| Investment in fixed asset | 50.00 | 50.00 | 50.10 | 50.60 | Expanding |
| Employment | 47.00 | 47.80 | 50.10 | 51.20 | Expanding |
| Business expectations | 49.40 | 55.50 | 63.10 | 61.70 | Optimistic |

Source: (The Fung Business Intelligence Centre 2014)

The major drivers for steady growth in China's transport and logistics industry are summarized as follows:

1. Chinese macroeconomic steady growth demands a corresponding growth and development in its transport and logistics industry. China's GDP growth registered 9.7 percent yoy in 2012 (National Bureau of Statistics of China 2013). In the 18th National Congress of the Communist Party of China, the target for China's GDP is around 7 percent per annum throughout 2011- 2020 (Li and Fung Research Centre 2012).

2. The rise of domestic consumption will stimulate demand for logistics and transportation services in China. China will rely more on domestic consumption as the driver of its economic growth. In 2010, the Chinese government moved consumption into the first place in the order of "three wagons that pull the economic growth" for the first time. To further expand its domestic consumption market, China's policy makers prioritised improvements in a more equitable distribution of income, urbanisation, improving basic public services and social welfare, and reforming the fiscal, tax and financial systems (Li and Fung Research Centre 2012). The target value for an increase in household consumption ratios is a move from 35 percent today to 50 percent within five years. The growth of domestic consumption has been accompanied by an increasing demand for transport and logistics services; conversely, China's transport and logistics industry development can play a pivotal role in inducing regional consumption. Investment in transportation and logistics facilities in the west and north of China in recent years, has contributed to increased consumption in these regions. Retail sales of consumer goods grew 19 and 18.4 percent year-on-year, respectively, in the China west and northeast in the first three quarters of 2009, which is 3 percent higher than the national average (ATKEARNEY 2014).

3. The development of the China's e-commerce industry is expected to further accelerate the growth in China's transport and logistics industry, especially, express delivery services. China's e-commerce

industry development in the last decade has grown exponentially. Currently, more than 460 million Internet users spend more time online, and almost 145 million people shop online in China. Both data are expecting to increase as China's current Internet penetration rate of 32 percent, which is much lower than that of the US's 77 percent. At the same time, the Chinese e-commerce industry is expected to grow with improvements in more purchasing power and more online security, as well as the widespread use of Internet-enabled cell phones (ATKEARNEY 2011). The total market size of e-commerce in China rose from RMB ¥ 6.21 billion in 2004 to ¥ 9.9 trillion in 2013, and is estimated to be ¥ 12.7 trillion in 2014 and ¥ 21.6 trillion in 2017 (see Table 2) (iResearch 2014). The swift growth in China's e-commerce market requires an increasing demand for logistics services, in particular, domestic express delivery service. For example, the online spending achieved RMB ¥ 19.1 billion and its express delivery volume hit a record of 50 million packages on a single day of 11th November 2012. Again, the online spending recorded RMB ¥ 35 billion on a single day of 11th November 2013 (see Table 3) (AliResearch 2014).

Table 2: The total market size of China e-commerce

| YEAR/RMB | 2004 | 2006 | 2008 | 2010 | 2011 | 2012 | 2013 | 2014 | 2017 |
|-----------------------|--------------|---------------|----------------|--------------|--------------|--------------|--------------|---------------|---------------|
| E-commerce (¥) | 6.21 billion | 30.29 billion | 192.38 billion | 4.8 trillion | 6.4 trillion | 8.2 trillion | 9.9 trillion | 12.7 trillion | 21.6 trillion |

Source: (iResearch 2014)

Table 3: The online spending on the 11th November from 2009 to 2013

| YEAR/RMB (¥) | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|-------------|-------------|-------------|--------------|-------------|
| Online spending on each year's 11th November | 0.1 billion | 0.9 billion | 5.2 billion | 19.1 billion | 35 billion |

4. Investment and development in big data, cloud computing, and the smart logistics network system could further reduce costs and improve efficiency of China's logistics industry, and contribute to a more robust logistics industry. According to DHL Trend Research (2014), big data is the new logistics tool and an untapped logistics asset that can boost logistics efficiency. The application of big data can contribute to i) the improvement of operational efficiency by making better decisions, optimisation of resource consumption and improvements in process quality and performance; ii) improvements in the customer experience and an increase in customer loyalty and satisfaction; and iii) the development of

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new business models. More Chinese industry players have begun to invest in big data, cloud computing and the smart logistics network systems. For example, in 2013, Alibaba group developed the China Smart Logistics Network (CSN) logistics system to achieve seamless information flows between vendors, online operators and logistics service providers. Alibaba's target is to provide a nationwide 24-hour delivery service within the next five to eight years by applying CSN. Since 2012, JD.com has implemented a warehouse management system for its vendors in phases to achieve information synchronisation and to streamline logistics processes between stakeholders (Fung Business Intelligence Centre 2013).

5. The Chinese government provides significant support to develop the China logistics industry. This is in part a recognition that the transport and logistics industry is constraining further economic success. Consequently, the Chinese government has issued a series of supportive policies and measures to accelerate the development of the sector in the last five years. For example, a Value-added Tax (VAT) to replace the Business Tax (BT) was piloted in November 2011 and extended nationwide on 1st August 2013 to avoid "double taxation". In 2012, notices relating to reforms in the urban land use tax policy for bulk commodity storage facilities of logistics enterprises, guidelines on accelerating the collaboration and development of express delivery services and online retailing, advice of the state council on further reformation of the distribution sector and acceleration of the development of the distribution sector, guidelines on accelerating the industrial upgrade of the warehousing sector were issued, and guidelines were put in place in 2013 (Fung Business Intelligence Centre 2013) on strengthening and improving the management of urban distribution. The Ministry of Industry and Information Technology introduced guidelines on accelerating informatisation on logistics, administrative measures concerning the regulation of the express delivery industry.

6. Increased environmental protection measures and low-carbon rules are suggested to be important sustainable drivers of China's transport and logistics industry. The most common environmental protection measures applied in China include recycling measures, route optimization, switching modes of transport to railways or inland waterways, and using low-emissions vehicles. Although environmental protection activities and carbon accounting in China's logistics industry are not widespread currently, an increasing number of China's transportation and logistics leaders have started introducing environmental protection initiatives as a part of core business goals, influenced in part by the increasingly important role of environmental protection measures at the international level as well as the increasing state regulations designed to reduce of carbon emissions. Building a low-carbon transportation system and introducing compulsory carbon emission targets by the Chinese government in its medium- and long-term plan of the national economy and social development are

important new starting positions. Road freight companies are now required to upgrade their vehicles and equipment to comply and satisfy the regulation of “Euro III” vehicle standards in major Chinese cities. The use of electric vehicles is being promoted by the Chinese government (Ruske et al. 2012; ATKEARNEY 2014).

3. Bottlenecks for China’s Logistics Industry Robust Development

According Zhang and Figliozzi (2009), challenges related to China’s transport and logistics are categorised as follows: Low efficiency and higher logistics costs; poor and lack of national integration transportation network, particularly, lacking of integration between different transport modes; congestion at ports and on the transportation system; poor IT infrastructure and an inability to use advanced technology; underdeveloped warehousing services; regional imbalance; entrenched regulation and local protectionism; and a deep culture and the need for Guanxi. In addition to the challenges, other bottlenecks are identified and discussed below.

4.1 *A scarcity of qualified logistics personnel*

China’s universities currently produce 10,000 logistics students each year (Fueling 2008). Although this seems a large number, there is a huge gap between supply and demand for qualified logistics personnel. Qualified and experienced logistics talent therefore represents a scarce resource in the rapidly developing logistics industry, and represents a major constraint to further growth.

The proportion of logistics costs in GDP was estimated to decrease by more than three percent between 2006 and 2010. However, in contrast to the development of logistics infrastructure, this proportion dropped from 19.4 percent in 2000 to 18.6 percent in 2005, and 17.8 percent in 2011 (KPMG 2011; Business Monitor International (BMI) 2012). A scarcity of qualified logistics personnel can partly explain the low efficiency levels observed in the country’s logistics industry. In turn, SC and logistics management principles are not properly understood nor implemented correctly. As a result, wastage and costs are inevitably higher than needs be.

4.2 *Inconsistent in policies and regulations*

Inconsistent policies and regulations in China lower service efficiency and add additional unnecessary costs to SC operations. For example, a truck may have to be loaded and unloaded multiple times, or cargo has to be transferred to a new truck when it reaches a city or provincial border and when it makes further progress into the next city or province (Fueling 2008). This not only increases transport

times and costs, it also increases cargo damage and loss. Agriculture products and products requiring cold storage provide a typical example of difficulties experienced in China, with the so called “costs increased in the last-mile”. It is not surprising to see highways became static during an eight day holiday, as was the case during the country’s national day in 2012, due to a sudden exemption of highway toll fees nationwide. Severe congestion caused by private cars as well as by trucks, caused unavoidable delays. In addition, inconsistent and fast-changing regulations and economic practices require an innovative approach to service design and implementation. These cannot be simply adopted from other nations, where information and material channels are well established and firms have a significant advantage in that they largely operate in a stable policy environment (Nor 2011). Within China, problems dealing with an unstable policy environment are further exacerbated by the scarcity of trained logistics professionals.

4.3 *Fragmented domestic freight*

A high proportion of export/import firms, transportation operators, and other intermediaries in China are Small and Medium Enterprises (SME). SMEs usually have insufficient resources to invest in modern equipment and technology, which often leads to increased wastage in terms of transportation and warehousing resources and an inability to provide more value-added-customer services. Furthermore, SMEs will typically lack the motivation to implement optimal SC management and security measures given the time and cost requirements to do so. Moreover, the rapid development of e-commerce in China, such as with Taobao, has also generated and resulted in the spreading of distribution orders over large geographical areas. This has resulted in higher logistical costs for each delivery than was previously the case. This has resulted in the Chinese government promoting and launching a common delivery implementation system in July 2012 to consolidate logistics service and reduce costs. The high proportion of SMEs within the market increases the difficulty with which market integration and service consolidation can be achieved. This in turn creates obstacles to the improvement of customer service and the reduction of costs.

Conclusions

This paper summarises the current size and performance of the Chinese logistics industry, analyses industry trends in China’s transport and logistics and the potential factors driving the industry’s development in the next few years, and investigates the challenges impacting on industry growth.

Undeniably, with the rapid growth of the Chinese economy, the hardware and software facilities related to the China’s transport and logistics industry have been increasingly put in place resulting in

massive growth in the transport and logistics sector. However, China's extraordinary economic growth, especially the emerging of China's e-commerce market, in exposing a number of critical weaknesses that the Chinese logistics industry is not currently well prepared handle. Despite remarkable progress, there is still a long way to go for the Chinese logistics industry to improve its efficiency to the level of most developed economies.

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