

The Relationship Between Transportation and Economic Development: The Yangtze Region

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INTRODUCTION

The rapid economic growth of China since the beginning of the economic reforms in 1978 has received much attention from economists and policy-makers throughout the industrialized world. China has experienced rapid economic growth since the beginning of the economic reforms in 1978. In terms of economic size, China is surpassed today only by the U.S., Japan, Germany, and France.² Despite the global economic crisis of 2008, the Chinese economy managed 8.7% growth in GDP in 2009, and much of this growth in GDP can be attributed to the stimulus package passed by the Chinese government.³

In all economies, the expansion of output is the sum of the growth of consumption⁴ plus investment plus net exports of goods and services. In the case of China, the expanding investment has attributed to the growth of China's economy. For China, investment averaged 36 % of GDP in the first decade of its economic reforms, relatively high by the standard of developing countries generally but not in comparison with China's East Asian neighbors when their investment shares were at their highest. Since the beginning of the 1990s, China's investment rate has trended up. In 1993 and again in both 2004 and 2005, investment as a share

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² China and France "compete" for fourth place, with the outcome depending on the exact Euro-USD exchange rate (*Statistical Abstract 2005*, p. 203).

³ A large proportion of the stimulus have been spent on the 'Go West' campaign, a major government initiative that aims to narrow the wealth gap between the coast and interior, the urban and rural. This campaign has the objective to alter the economic landscape over the next few decades. See the publication *Yangtze Transport: Accessing China's Interior (2010)*, an investment guide published by the Yangtze Business Services, London, United Kingdom.

⁴ In the national accounts, consumption would include personal and government consumption of goods and services.

of GDP reached 43%, a level well above the historic experience of China's East Asian neighbors in their high-growth periods.⁵

Because of this rapid economic growth, China has also become a major participant in the global economy. In fact, many foreign investors have also invested heavily in the different regions of China especially in the central and western areas. Many foreign firms are looking in these areas to expand their operations because of its lower costs of production. However, once these goods are produced, there needs to be a comprehensive transportation system to allow in the ease of the shipment of goods. The Yangtze River is an effective multimodal form of transportation that will allow for an easy transport of the good to the domestic and international markets. Because of the multimodal advantages of the Yangtze River, the Chinese government has invested in the enhancements of the infrastructure of the Yangtze River in order to improve its transportation system. In fact, for the budget allocations for 2009, the Chinese government set aside Rmb103.5bn for roads, Rmb73.2bn for railways, Rmb24.2bn for airports and Rmb10.3bn for the Yangtze waterway. The objective for these enhanced transportation projects are to connect rural villages to urban areas in the interior provinces which is part of the government's Go West initiative.⁶

In fact, there is a large population based in the Yangtze region which contributes immensely to the GDP of China.⁷ Since the immense investments into the transportation system in the Yangtze region have attracted investors to the region, these investments had led to the economic growth of this region and for China. In fact, the economic growth of the Yangtze region has exceeded the economic growth of Korea, Taiwan, and other industrialized Asian countries.⁸

In this paper, we look at the effects of the implications of the transportation and economic development in the Yangtze region. Additionally, the balance of this paper is as follows: a review of the transportation and regional economic development, the initial development in the Yangtze region as spawned by the economic reforms by the Chinese government in the 1970s and early 1980s, the implications of infrastructure investments in the Yangtze region and its regional economic development, and the final section provides final thoughts and conclusions.

TRANSPORTATION AND REGIONAL ECONOMIC DEVELOPMENT

In the 1980s economists started the examination of the effects of public investments on economic development, and future researchers have undertaken numerous empirical assessments

⁵ All these estimates of the expenditure components of GDP (i.e., consumption, investment, government, and net exports) were from the National Bureau of Statistics of China (2006) which was released in September 2006.

⁶ See the publication *Yangtze Transport: Accessing China's Interior (2010)* by the Yangtze Business Services, London, United Kingdom .

⁷ *The Yangtze River Transport Corridor*, Deloitte and Touch USA, LLP, July 2006.

⁸ See Kwan, C. and K. Knutsen. (2006). Supply Chain Management Review for a review of the recent economic activity in China.

that explore the relationship between transportation investment and economic performance.⁹ Economic performance is often measured by output, value-added (GDP), productivity and employment. Additionally, some empirical assessments have explored the impact of infrastructure investment that used the production function to assess its impacts on technical efficiency.¹⁰

A major finding from empirical literature up to early 1994 is that “a positive statistically significant but small effect of public capital on output has been confirmed by many.” However, *structural* changes in relation to infrastructure investment have not received much attention in the literature. More specifically, these structural changes are comprised of the following: “*differentiated economic linkage* between specific industry and specific type of infrastructure,” the role of investment flows in examining “the *derived* demand for public infrastructure by private sector,” and “the relationship between infrastructure types, i.e., complementary vs. substitutable.” More specifically, the research concerning the relative productivity for each of the different types of public infrastructure is often constrained by data limitations, and such analysis requires data by infrastructure type or mode of transportation.¹¹

Given the extensive research, improvements in transportation infrastructure not only support regional economic growth by lowering the transportation costs for the users of the transportation system but also there are direct benefits such as improvements in travel times, increased reliability, and increased safety in the flows of people and goods. More importantly, as transportation costs are reduced, these resources can be used for other regional programs to enhance the quality of life.¹²

Businesses directly benefit when goods can be shipped faster at lower costs to its markets. Since improvements in transportation infrastructure provide improvements in travel times for individuals, this will enable individuals to benefit from increased employment opportunities as their commuting range has been increased. Consequently, the supply of labor to employers will increase as there will be more potential employees fall within this feasible commuting range.

⁹ See Aschauer, D.A. (1989). “Is Public Expenditure Productive?” *Journal of Monetary Economics* 23, 177-200. Ashauer concluded that small investments in public capital will have a major impact on GDP, but the time series analysis suffered from methodological issues such as the trend in the data, leaving in the effects of the oil price shocks, and other methodological issues. These methodological; issues have resulted in a high and implausible elasticity of output on public capital of .39.

¹⁰ For example, see Demetriades, P.O. and T.P Manuneas (2000). “Intertemporal Output and Employment Effects of Public Infrastructure Capital: Evidence from 12 OECD Economics,” *The Economic Journal*, 110, 687-712.

¹¹ See Bell, M.E. and T.J McGuire (1997). “Macroeconomic Analysis of the Linkages between Transportation Investments and Economic Performance,” Transportation Research Board, National Research Council, Washington, D.C., NCHRP Report 389. This report provides a comprehensive literature concerning the studies determining the effects of investments in public capital on GDP has been small but statistically significant. Many of these empirical assessments used panel data and determined that these elasticities of output with respect to public capital are smaller than the time series methods.

¹² Helling, A.(1997). Transportation and Economic Development: A Review *Public Works Management Policy* 2: 79-93

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Secondary effects on regional economic development will also incur. These secondary benefits would be the expansion of businesses because of lower transportation costs that allows for higher profitability and even a greater market share. As a result of these latter improvements, there will be increased employment in the region and higher incomes generated by individuals. Since business opportunities have expanded, regional economic activity would increase as these growing businesses demand more raw materials and other goods from their suppliers. Since regional incomes have increased, the retail and service sector would grow since individuals have more disposable income to spend on goods and services.¹³

As the Chinese economy becomes more developed especially with its increased role in international trade, goods are being transported over longer distances, and transportation costs become an important cost in the production of goods. Because of the cost consideration, it requires a seamless transfer of components, finished products, and bulk commodities between ships, railcars, airplanes, and trucks.

Because much of the freight traffic is containerized, some of these products are often being transferred from ship to railcars or trucks, without handling the goods themselves. The boxes are simply lifted from one mode and placed in another mode for shipment. In general, products traveling over long distances may realize substantial savings by moving via containerized shipments along the Yangtze River rather than having shipments via truck or even rail.¹⁴ In order to be able to accommodate this increase in shipments, the transportation infrastructure in the Yangtze region needs be developed. For the Chinese shippers to take advantage of the economies of scale from intermodal transportation, the development transfer facilities at key points must be available to the shippers. These transfer facilities can consist of rail corridors or development of major highway systems located near major urban areas. Consequently, there will be spillover effects from the development of the transportation infrastructure.

CHINA'S INITIAL ECONOMIC DEVELOPMENT OF THE YANGTZE REGION

In order to understand the rapid development of the Chinese economy, namely the Yangtze region, some historical background would be needed to understand the antecedents leading to the current economic growth. In the late 1970s, the Chinese government began to implement economic or market-based reforms in order to develop the economy. At this time, the Chinese economy was primarily agricultural with 80 % of the population involved in this sector. The earliest form of economic reform during these early years by the government is to implement reforms in the agricultural sector by dismantling the commune system and farming resumed on basis of household plots of land. By implementing these reforms, the Chinese

¹³ Sloboda, B.W., and W.V. Yao (2007). "Interstate Spillovers of Private Capital and Public Spending." *Annals of Regional Science*, 42(3), p. 505-518.

¹⁴ During the Industrial Revolution in Europe and the United States in the 19th century, water transportation was the cheapest form of transportation for shipping goods long distances. Water transportation is still the cheapest mode of transportation, and investments in infrastructure and transportation technology can improve the comparative advantage of a region.

government will allow decisions to be made which would allow for surplus of goods. Then by creating these surpluses in food, this can be sold in markets which would allow for profits. This surplus food can also be sold in international markets, and this would allow China to be more integrated into the international markets.¹⁵

Once the first reforms were implemented in the agricultural sector, the financial sectors and the industrial sectors were also reformed. The government allowed for managers in the financial and the industrial sectors to make more decisions based on market-based principles and did not need to adhere to the economic plans developed by the government. The financial sector needed to be overhauled in order to provide the necessary credit to allow for economic development to spread throughout China.

A significant reform implemented by the government is the development of economic zone or regional zones. The objective for these economic zones will allow for the creation of linkage effects for the adjacent regions. Realizing the positive benefits of these economic regions, the central government did not have the technology to manufacture the goods. Consequently, the central government allowed foreign investors to establish operations in China as a means to provide capital and expertise to improve its competitiveness for a multitude of goods. Once the foreign investors would invest in these zones, they had access to its low cost labor force. Then the central government would provide product development, the equipment, and its knowledge of world marketing channels. That is, if one economic zone is highly developed, then this growth could spillover into the adjacent regions. These economic zones allowed foreign businesses to be exempt from the costly regulations, tax laws, and the labor standards as applied to the rest of China. Each of the economic zones often specialized in a fixed basket of good. Despite these differences, each of the economic zones had similarities:

- a. objective is to promote exports, not protect domestic markets
- b. provide subsidies for good performance, e.g., growth of exports in international markets
- c. temporary subsidies rather than permanent subsidies, i.e., a five year tax holiday for new export firms.¹⁶

The first economic regions created were in the costal and river basin regions such as the Pudong and Shanghai regions. The development of Pudong and Shanghai areas allowed for the spillover of these positive economic benefits to other regions of China, namely the central and

¹⁵ Dickinson, D. (2002). 'Monetary Policy and Structural Changes in the Financial Sector in China in *Contemporary China: The Dynamics of Change at the Start of the New Millennium* editors P.W. Preston and J Haccke, New York: Routledge. See also Waters, Harry J. (1997). *China's Economic Development Strategies for the 21st Century*. Greenwood Publishing: New York.

¹⁶ Bajpai, W. (2004). "Regional Economic Policies, Geography, and Growth Episodes in China's Costal Provinces: Lessons for the State of Gujarat." A Working Paper, Center for Globalization and Sustainable Development, The Earth Institute at Columbia University, www.earth.columbia.edu.

the western regions of the country because the central western regions of China had lagged behind the eastern part of China.¹⁷

Research has shown that FDI is highly correlated with the GDP growth of a province. However, empirical models have been developed to determine if the flow of FDI funds is based on economic policy (funds flow to provinces with the best growth potential) or a policy model which states that funds flow to provinces with the best preferential policies, not the best economic policies.¹⁸

Table 1: Comparisons of the Economic Zones , 2002

Economic Zone	Population	GDP	Imports
Pearl River Delta	3,922	24,200	3,493
Yangtze River Delta	9,477	21,200	978
Beijing-Tianjin-Hebei	6,510	9,544	355
Shandong Peninsula Area	3,980	6,228	126
Middle and Southern Liaoning	2,670	3,671	114
Taiwan Strait	4,679	6,569	348
Chongqing, Chengdu Area	9,956	7,089	37

Source: *China Annual Statistics 2004, Chinese Competitively Development Report 2003.*

Population are in ten thousands; and GDP is 100 million Yuan.

Quite interestingly, the economic zone of Chongqing-Chengdu has smaller economic indicators than other economic zones. However, Chengdu-Chongqing Economic Zone has a population of 99.56 million people, which gives this economic zone the necessary labor force for further economic development. With the continued developments of the economy, the potential market capabilities will continue to grow and enhance economic development of this region.

Because of the positive benefits of additional employment generated in these economic zones, this increase in employment will generate positive, spillover effect to the rest of the

¹⁷ In fact, the western region experiences a poor system of highway infrastructure compared to the central and eastern regions. The provinces of Tibet and Qinghai have poor road infrastructure with a road density of 33 km per thousand square kilometers of land. In addition to the lack of highway infrastructure, the highway quality is also poor in the western part of China. There has been a major push for expanding highway infrastructure in the western part of China see Sloboda, B.W. and V.W Yao. (2007). "The Development of the Chinese Transportation Infrastructure: A Case of Highway Development." *Journal of the Washington Institute of China Studies.* 2(3), 60-72.

¹⁸ Wang, S. and A. Ha. (1999). *The Political Economy of Uneven Development: The Case of China.* Armonk, NY: M.E. Sharpe.

country. Additionally, the quality of employment would improve because of the shift from the agricultural sector to other sectors. This shift in employment has created a growth of light industry and service activities which would benefit the domestic and international markets.

The implementation of the economic zones has provided useful lessons for economic development of a nation.

- a. Economic zones allowed for transfer of management skills from abroad
- b. Economic zones have resulted in the creation of exports which allow for greater exports to international markets and a prominent presence in world markets.
- c. Allowed for the development of infrastructure in the economies that require it in order to be competitive. For example, Guangdong lagged behind Shanghai in terms of infrastructure. With additional investment in infrastructure, Guangdong has become more developed.¹⁹

CURRENT STATUS OF THE YANGTZE REGION

The provincial governments in the Yangtze region were insulated from the Chinese policy of openness and economic reforms in the 1980s. However, the provincial and municipal governments in the Yangtze region began to develop their own economic reforms even prior to the seminal visit of Deng Xiaoping to Shanghai in 1992. The result has been the development of economic growth rates higher than other Asian economies including the Pacific Rim countries. The strategic location of the Yangtze region and major transportation improvements planned in the late 1990s have allowed for the rapid economic development of the Yangtze region.

Just over 50% of the FDI injected into China has built up the economy especially in the Yangtze region. The Yangtze region is an area on the central-east coast of China centered on Shanghai. Radiating outward from Shanghai for about 200km to the north, west and south is a vibrant economy represented by a generally mature transportation infrastructure, well-educated and disciplined workforce, and government administrators experienced in working with Western companies. From Shanghai westward to Suzhou and then Nanjing, and southward to Hangzhou and Ningbo, one will find the highest concentration of foreign manufacturing investment anywhere in China. In order to maintain the rapid growth of the Chinese economy, there needs to be an infusion of foreign capital.²⁰

¹⁹ Bajpai, W. (2004). "Regional Economic Policies, Geography, and Growth Episodes in China's Costal Provinces: Lessons for the State of Gujarat." A Working Paper, Center for Globalization and Sustainable Development, The Earth Institute at Columbia University, www.earth.columbia.edu.

²⁰ Waters, H. J. (1997). *China's Economic Development Strategies for the 21st Century*. Greenwood Publishing: New York.

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The main driver for economic growth in this region is the concentration of foreign investors which had become a major engine for economic growth for China.²¹ In fact, China has been divided into twelve markets which are often distinct territories with each region having its own market characteristics. Because of these regional distinctions, foreign investors invested in the areas of interest which match their market characteristics. This led to the economic development of cities and provinces in China.²²



Figure 1: Map of the Yangtze Region

Source: *The Yangtze Delta Region in China*, Chreod, 1995.

As indicated in figure 1, this region primarily includes Shanghai, municipality as well as consisting of the Jiangsu, Zhejiang, and Anhui Provinces. Additionally, there are 225 cities, towns and counties in this region which has a population of 193 million within a 500 km radius of Shanghai. Because of the high population this represents the largest contiguous concentration of people in Asia. The population of this region is slightly larger than the entire population of Indonesia, three times that of the Philippines, and three and a half times that of Thailand. In the Yangtze region, 35 cities have populations exceeding one million. In comparison, only 33 such

²¹ *The Yangtze Delta: China's Largest Market*, downloaded from www.chreod.com which was last accessed February 28, 2008,

²² *Ibid*

urban areas exist in all of North America and only 42 exist in Europe, including Eastern Europe. The population density in the region is nearly 530 inhabitants per kilometer, the highest of any country or region in East Asia after Taiwan.

Because the Yangtze region is major economic force in China, figure 2 shows the comparison to the freight movements between Chongqing, Wuhan and Nanjing in the upper, middle and lower Yangtze River respectively to the Chinese GDP. Chongqing is a major force in this region. These comparisons would show the relations of ports to the urban economies are different. The results of calculation and comparison to the data from 1997 to 2005 showed that the relation of freight movements of Nanjing to its GDP was linear, and that the freight movements of Wuhan exhibited more regressive freight movements. However, the driving power of water carriage freight amount to GDP in Chongqing was stronger than for Nanjing with each ten million ton of water carriage freight have driven GDP to increase about 70 billion Yuan RMB in Chongqing, but it was 50 billion in Nanjing. This shows that the economical developments of Chongqing depend much more on port, and an important aspect of Chongqing internationalization is fully to exert the fresh river shipping potential of Yangtze River and develop imported processing industries.

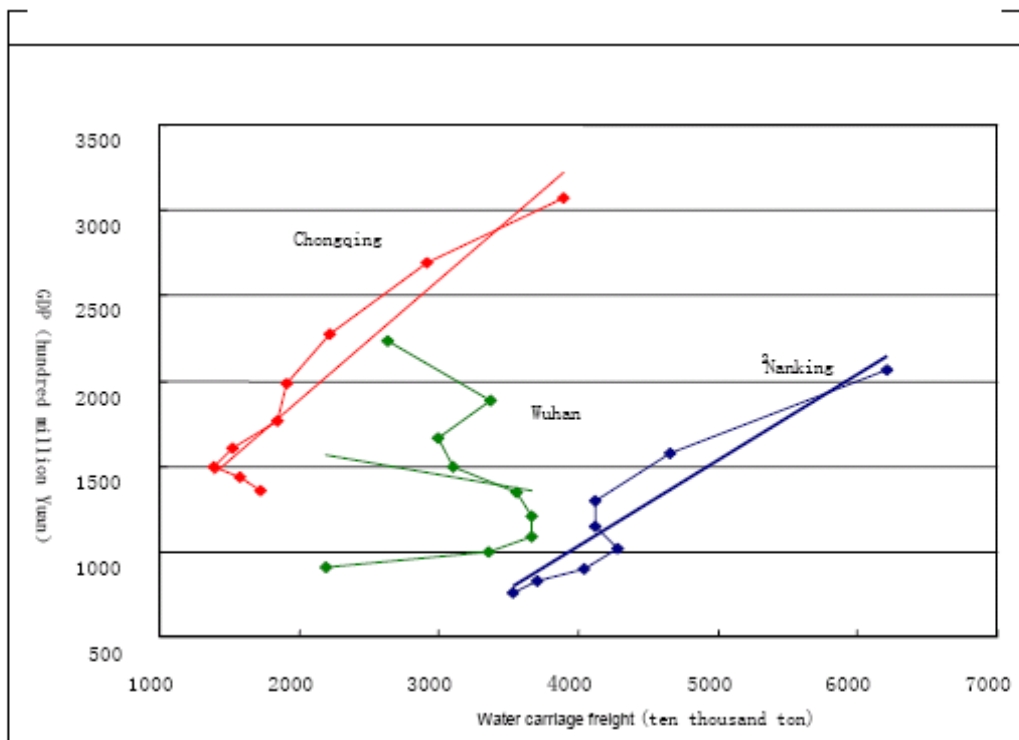


Figure 2: Relation of Water Freight Movements to the GDP in the Cities along the Yangtze River: 1997-2005
Source: Zheng Degao, "Ways of Development for Chinese Inland Cities," 43rd ISOCARP Congress, 2007

Freight movement on the Yangtze River accounted for approximately 30 % of all cargo in 2001 which is 6.8 % increase over 2000. Since 2001 there has been a steady increase of freight movements on the Yangtze River and the use of the ports. These improvements have allowed for greater economic development for the regions in the Yangtze region especially in the

western region of China, and western cities such as Chongqing, Xian, and Wanxian have also experienced significant growth. Table 2 shows the total cargo handled at the major river ports in 2000.

Table 2		
Total Cargo Handled at Leading Yangtze River Ports, 2000		
(in thousands of tons)		
Port	2000	Percent Growth
Nanjing	66,700	13%
Nantong	27,480	21%
Zhenjiang	21,530	27%
Zhangjiagang	20,250	27%
Wuhan	17,380	12%
Chongqing	7,810	29%
Anqin	7,290	11%
Jiangyin	6,660	11%
TOTAL	183,490	
Other	50,510	
Grand Total	234,000	17%

Source: Chinese Ministry of Communications, 2001

Collectively, 25 ports shown in Table 1 saw the volume of freight increase 17 % over 1999. In fact, this freight traffic is not just production by the domestic firms but also includes international firms that have production facilities in the Yangtze region.²³

Table 3 shows the freight movements by total commodity, coal products and iron and steel products for the years 2002-2007.

For each of these categories, there has been an increase each year in the amount of the total throughput, coal, and iron/steel products carried along the Yangtze River. In fact, this steady growth in freight movements can be attributed to the growth in the Chinese economy, an increase in the Chinese international merchandise trade, improvements in freight sector productivity, and the availability of an extensive multimodal transportation network in China. That is, there is a close linkage in the economic growth and growth in freight shipments and much of the economic growth in China in the past two decades are largely attributed to international trade.

²³ *China's Transport Infrastructure and Logistics*, APL Logistics, April 2003.

	2002	2003	2004	2005	2006	2007
Total Throughput	256.61	306.98	469.76	653.54	787.74	918.24
Coal	51.87	57.74	91.79	123.84	148.72	179.16
Iron and Steel	21.26	28.84	42.01	45.3	53.21	63.66

Source: *Yangtze Transport* (2008) as prepared by Yangtze Business Services Ltd.

TRANSPORTATION INVESTMENTS IN THE YANGTZE RIVER AND REGIONAL ECONOMIC DEVELOPMENT

As mentioned earlier in this paper, enhancements to transportation infrastructure provide numerous benefits, namely regional economic development or enhancing economic growth, which is often measured through sustainable increases in regional income and accumulation of wealth. Additionally, improvements in transportation infrastructure not only support regional economic growth by lowering the transportation costs for the users of the transportation system but there are also direct benefits such as improvements in travel times, increased reliability, and increased safety in the flows of people and goods.

The Chinese government expects the cost of moving containers by barge along the Yangtze River to fall quite significantly. These transportation costs would be reduced because the new infrastructure will allow for expanded service as well as fleet upgrades. The increased demand for the use of the Yangtze River would be attributed to foreign firms as well as domestic firms. These firms will take the opportunity of lower transportation costs via slower barge movements. Additionally, the investment in infrastructure will also include the deepening of the Yangtze River which will allow for large-sized vessels which will be able to take additional freight. Consequently, the use of these large vessels will result in lower per unit costs than the transportation by rail and motor carriers to the various distribution centers throughout China.

Despite the positive benefits of the freight movements on the Yangtze River, there still exists some problems. The main problem deals with the lack of advanced infrastructure to receive and disperse freight at some of the ports. That is, not all the ports along the Yangtze River can handle freight equally well. The latter becomes problematic in the more interior ports along the river. Additionally, not all the ports do not have access to other modes of transportation to help move the goods to the final market. That is, the development of roads and railroads is lagging behind the demand for these transportation services. The Chinese government needs to provide additional infrastructure investments to allow ports to handle freight more effectively; in addition, the Chinese government also needs to develop road and rail along the Yangtze River in order to allow for an effective use of multimodal transportation of freight. That is, the central ports will serve as feeder ports which will require an effective highway system and rail terminals to transport the freight. Moreover, these highway systems and

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rail terminals would often be located or pass through towns within the region.²⁴ The development of the latter would enable for these towns to benefit from the increased traffic from these freight movements. Currently, there is not an effective Yangtze River intermodal transportation network, and the Chinese government will need to provide additional investments in the development of this intermodal transportation network.

Some of the cities in the interior sections of China have experienced major economic growth as the freight movements increase attributed to the location of domestic and international firms. One of the cities, Wuhan, is often referred to as the “Chinese Chicago” since it is located in a geographically desirable area or is the epicenter of China. That is, Wuhan is located on desirable east-west and north-south transportation routes. Wuhan is known as a major industrial city, but Wuhan is now becoming known for fiber optics, bio-engineering, and microelectronics. A major advantage of Wuhan is the deep waters of the Yangtze River which allow for larger size vessels to transport freight to and from Wuhan.^{25,26}

Chongqing is another city along the Yangtze River that has experienced rapid economic growth in the five year. Unlike Wuhan, Chongqing is a city located in the western part of China that is mountainous. Consequently, it was rather difficult to move freight effectively in this mountainous region, and transportation costs were extremely high. Furthermore, port operations were archaic and could not handle inbound and outbound freight traffic like Wuhan. Because of the infusion of foreign capital and infrastructure investment by the Chinese government, Chongqing has made the improvements to transportation infrastructure to allow for improvements in the inbound and outbound movements of freight. In the surrounding area of Chongqing there is an abundance of coal, natural gas, and other natural resources that has allowed for Chongqing to become a major petrochemical center in addition to being an industrialized city.²⁷ In 2007, nominal GDP of Chongqing was 411.18 billion yuan (US\$56.3 billion), a rise of 15.3% over 2006, and its per capita GDP was 14,339 yuan (US\$ 1,964).

As transportation and communications continue to improve in China, it improves the relations between other provinces and municipalities. Additionally, these improvements in transportation and communications have allowed towns and cities to develop specializations in certain industries that can generate the production of goods/services to be used in domestic and international trade.

CONCLUSION AND FINAL THOUGHTS

In China there is a major economic expansion and much of this economic expansion is attributed to the investments in transportation infrastructure in the Yangtze region that has

²⁴ *China's Transport Infrastructure and Logistics*, APL Logistics, April 2003.

²⁵ In contrast to Wuhan, the city of Chongqing has seasonal fluctuations in water levels in Yangtze River which has an effect on the size of the vessels. After the completion of Three Gorges reservoir in 2009, the seasonal fluctuations will end and deeper waters would result which can handle larger vessels. Thus, this will increase the volume of the inbound and outbound freight traffic along the Yangtze River.

²⁶ *The Yangtze River Transport Corridor*, Deloitte and Touche USA LLP, July 2006.

²⁷ *Ibid.*

provided positive spillover effects to the regions around the Yangtze River. The investments in the infrastructure will also require the development of other modes of transportation that can also assist in the transportation of freight from the Yangtze River. The motor carriers and rail modes have been receiving many upgrades in the past decade and can handle large volumes of freight traffic. For water transportation using the Yangtze River, it is the low frequency and the reliability of services, namely the speed that does not entice commercial shippers to use water transportation along the Yangtze River. Additionally, river transportation is cheaper than road and rail transportation over long distances. In fact, some policy-makers do not think costs will come down that much, although efficiency should improve with the vessel standardization program and more market competition between the operators.²⁸

More specifically, the development of Chinese inland major cities still face many problems such as low total level of economic developments, the high proportion of rural population, deficient consumption capability, weak developments of surrounding towns, etc. The Chinese government should develop a different approach for promoting economic development by promoting more investments in transportation infrastructure in these areas especially in roads and railroads because these modes will be needed in the complement of the barge movements along the Yangtze River. In fact, these inland major cities should change its current approach by depending on the provincial and national government. Additionally, they should join the global economies completely, take the development approach of internationalization, regionalization and urban-rural planning. The internationalization of inland cities should be different with those of seashore cities; they should lead a development with their own special conditions based on the combination of their own social, economic and basic equipment conditions.

²⁸ See *Yangtze Transport: Accessing China's Interior (2010)*, Yangtze Business Services, London, United Kingdom.