Erasmus University Rotterdam

**MSc in Maritime Economics and Logistics**

*2010/2011*

# Gwadar Port from the Perspective of Xinjiang Province of China

By

Jialing SUN

## Acknowledgement

After one year of laborious study, I eventually finished my master courses and master thesis. Even though it is a big challenge for me, actually it is really rewarding. Not only did I obtain professional knowledge and skills, but also make friends from various countries. Apart from my own diligence, my master study could not be accomplished without numerous people's assistance.

Above all, I would like to express my greatest gratitude to my supervisor Dr. Gujar who provided me with utmost and elaborate guidance and supervision throughout the whole process of my thesis writing, from choosing topics to writing. I really appreciate his critical and valuable suggestions. Without his patience and encouragement, my thesis could not be completed in such a professional and academic form.

In addition, I would like to express my heartfelt thanks to all the teachers from whom I acquired knowledge. Their conscientious attitude towards scholarly research and solid professional knowledge erect good examples for me, and also let me make a significant progress. Meanwhile, I would like to express my sincere thanks to all my assignment partners for their active collaboration and conscientious work. Without them, I could not obtain quite satisfactory scores. Besides, I would like to thank our coordinators, Mrs. Renee and Ms. Kim, for their generous help and care when I met troubles.

At last, I would like to express my deepest gratitude and appreciation to my mother for her consistent contribution and support. Without her understanding, consideration and encouragement, I could not realize my dream of studying abroad and could not overcome the difficulties during my one-year study.

## Abstract

Since the reform and opening-up, apparent and serious economic disparity has existed between the eastern coastal region and the inland area, especially western China. Such unbalance adversely influences the sustainable development of China's economy. In order to resolve this chronic problem, Chinese government proposed related policy as well as developing logistics system and transportation infrastructure which are bottlenecks for economic development of western China. Xinjiang, as an important gateway in the west for inland area of China, plays an indispensible role in national logistics development. For the purpose of optimizing distribution network in the west part, China has made immense investment in the Gwadar Port construction of Pakistan. Thus, the objective of this thesis is to analyze the importance of Gwadar port development from the perspective of Xinjiang Province of China.

Based on literature review, this thesis presents the status of economic development, transport system development and dry ports development of China, especially the western part. By adopting SWOT analysis method, this thesis specifically analyzes the various internal and external factors that affect Gwadar Port development from the perspective of China. Actually, the development of Gwadar Port will bring about a wide array of benefits not only for Pakistan, but also for China, especially logistics optimization of inland China. In addition, the establishment of Gwadar port in Pakistan significantly stimulates logistics improvement of inland China, especially that of Xinjiang Province which is connected with Pakistan by Karakorum Highway. And their benefits are mutual, namely Xinjiang also plays an important role in Gwadar Port development. Notwithstanding that, dry port which improves efficiency of transport as well as enhancing connection between hinterland and ports still needs to be developed in Xinjiang for further optimizing distribution network of China.

This thesis provides an overview of logistics status in western China and makes a contribution to the scare research on the logistics development situation in the west of China. However, due to limited number of related academic research and relevant data, this thesis mainly focuses on qualitative analysis instead of quantitative analysis.

**Key words**: Logistics system, Dry port, Gwadar Port, Xinjiang

## Table of Contents

## List of Tables

## List of Figures

## List of Abbreviations

BOO: Build, Own, Operate

BOT: Build, Operate, Transfer

CARs: Central Asian Republics

DWT: Deadweight Ton

EPZ: Export Processing Zone

GDP: Gross Domestic Product

GPA: Gwadar Port Authority

IPI: the Iran –Pakistan – India Gas Pipeline

ISM: Interpretive Structural Model

NTHS: National Trunk Highway System

SEZs: Special Economic Zones

SWOT: Strength, Weakness, Opportunity and Threat

TAP/TAPI: the Trans-Afghanistan Pipeline

TPL: Third Party Logistics

WTO: World Trade Organizaiton

# Chapter 1 Introduction

## *1.1 Background*

Due to low labor cost and favorable transport network, China has become global manufacturer and the largest exporter. This undoubtedly stimulates the trade and economic development of China. Thomas A. Foster (2007) demonstrated that during recent 25 years period, the GDP of China has increased by 10 percent. Meanwhile, its export volumes have also grown by approximately 16 percent every year.

In the last few decades, on the basis of Reform and Opening-up Policy, Special Economic Zones (SEZs) are mostly coastal cities. Also, most industries, economic activities and prosperity concentrate on China's coastal cities, like Shanghai, Guangzhou and Shenzhen, of which port facilities and corresponding infrastructures are appropriately developed. However, recently, the government is focusing on economic development of the inland regions by generating industrial specialization clusters. For example, Chongqing, specializing in automotive and industrial production, is being developed as a dry port to boost economic development of western part in China. Instead of mainly depending on producing and exporting cheap goods, China – the largest exporter in the world – is improving its market to boost the economic development of inland region and domestic consumption (Thomas A. Foster, 2007). Moreover, apart from establishing industrial specialization clusters, China is focusing on improving national logistics system and optimizing distribution network, especially that of inland region, in order to facilitate inland economic development.

## *1.2 Transport System in China*

No matter how the Chinese government develops and stimulates economic development, transport still plays an indispensible part in this process. According to Jin et al (2010), transport, as an important evaluation indicator of development situation in a region, conducts and backs up the socio-economic development. In addition to shaping the configuration of spatial socio-economic structure of a region, transport infrastructure is also of significant importance in terms of the regional accessibility. During last few decades, a relatively comprehensive transport system which consists of railway, highway, airplane, inland waterway and shipping network is constructed. By the end of 2005, the total mileage of China's transport network had reached 2.1 million kilometers, including 754000 km of railways and 1.93 million km of highways (Jin et al, 2010). Even Tibet is also accessible via train since the operation of the Qinghai – Tibet Railway in 2005. At the same time, China operated 1000 ports and 135 civil airports.

In China, there are 8 major railway lines which are defined as “5 Vertical lines and 3 Horizontal lines”. The 5 Vertical lines refer to Beijing – Shanghai – the traffic artery of East Coast – links North China and East China; Beijing – Kowloon; Beijing – Guangzhou which connects North China, Central China and South China; Jiaozuo – Liuzhou; Baoji – Kunming, as a stimulus for the construction and development of the southwest part of China. Beijing – Baotou – Lanzhou line, Lianyungang – Lanzhou – Alataw Pass line and Shanghai – Kunming line constitute the 3 horizontal lines, which enhance the connection between North China and Northwest and stimulate the northwest development as well as complementing and supporting the Yangtze River.

As for highway construction, since 2004, China has signed the Intergovernmental Agreement on Asian Highway Network. According to the plan, the highway networks of Northwest China, Southwest China and Northeast China will be connected with Kazakhstan, Pakistan, Nepal, Myanmar, Laos, Vietnam, North Korea, Russia and Mongolia etc. countries through Horgos and other 16 frontier ports. According to China Highlights (2010), currently China has more than 140,000 kilometers of navigable inland waterways. The Heilongjiang River, the Yangtze River, the Pearl River, the Huangpu River and the Beijing – Hangzhou Grand River are major navigable rivers of China.

As for port, an integrated transport hub and distribution centre for freights, plays a pivotal role in the whole transportation system. In China, on the basis of regional economic development situation and corresponding hinterland area of port, there are five main coastal port clusters (as figure 1.1 displays):

The Bohai Sea Rim Region: Qingdao Port, Dalian Port and Tianjin Port are three dominant ports in this region. Qingdao Port which owns favorable natural conditions and adequate supply of cargoes is progressively important in the international maritime system. As gateway of northern part of China, Dalian Port is confronted with various opportunities, especially when government proposed several economic and development policies, like “Coastal Economic Belt in Liaoning” and “the Rejuvenate of Old Industrial Bases in Northeastern China”. In terms of Tianjin Port, it is located in Beijing-Tianjin-Tangshan Economic Zone with sufficient cargo sources.

The Yangtze River Delta, in which Shanghai Port and Ningbo-Zhoushan Port are pillars, is highly developed. In addition to advantageous geographic location and preferred hinterland coverage, Shanghai Port and Ningbo-Zhoushan Port possess good infrastructures and facilities. In recent years, they become increasingly competitive among international ports and more important for international trade.

Port Cluster of the Pearl River Delta is mainly comprised of Hong Kong Port,

Shenzhen Port and Guangzhou Port. Hong Kong Port, of which the container throughput continuously ranks the top four in the world, is a critical international shipping center. Being adjacent to Hong Kong Port, Shenzhen Port will be significantly improved with the completion of Da Chan Terminal in the future. In particular, its throughput capacity will be greatly expanded. As manufacturing expands to Zhongshan, Guangzhou and other nearby regions, Guangzhou Port is also a major gateway for export and import.


**Figure 1.1: Five Port Clusters in China**

*(Source: Invest China Focus (2004), China Economy, www.greenway2china.com)*

Xiamen Port and Fuzhou Port, as two main ports, dominate the port cluster in the Southeast Coastal Area. As for the Southwest Coastal Area, Zhanjiang Port and Fangcheng Port are gradually developed.

Dependence upon the major ports aforementioned, some dry ports which undertake transshipment and alleviate congestion at seaports also have been developed in China during recent years. There are mainly four dry port clusters: dry port clusters that are respectively constructed in the Bohai Rim Region relying on Tianjin Port; in the northeast region on the basis of Dalian Port and Qingdao Port; in Jiangsu and Zhejiang Coastal Area depending on Shanghai Port and Lianyungang Port and in the Pearl River Delta.

## *1.3 Gwadar Port in Pakistan*

1.3.1 Development Process

According to some related reports, Gwadar Port was inaugurated by Pakistan in March 2005 and became operational in March 2008 when the ship with 52000 tons of wheat from Canada berthed here. According to Gwadar News (2010), the development of Gwadar Port is undertaken in two phases (As Figure 1.2 displays).

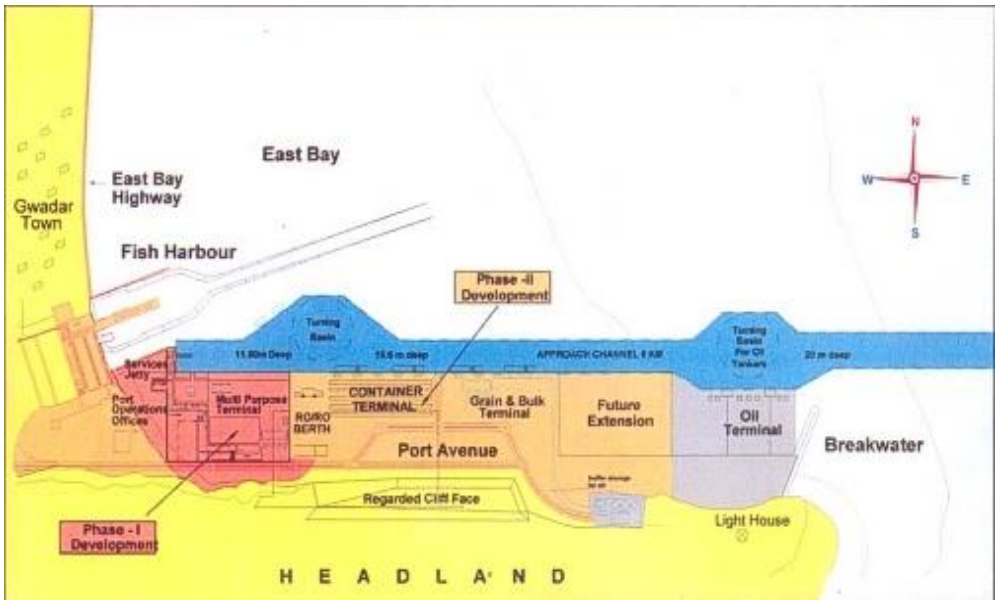


**Figure 1.2: Two Phases of Gwadar Port Development Project**
*(Source: Gwadar News – Gwadar news & business source)*

Since 2005, projects in Phase I have been completed, which included 602m berths and turning basin of 450 diameters as well as 4.5 km long approach channel with draught of 11.5m to 12.5m. Meanwhile, 3 multipurpose berths and one 100m service berth were constructed. In addition, the port was equipped with related infrastructures and necessary port handling equipments which are required for smooth operations of a modern port. As expected, the port after phase I can handle bulk carrier of up to 30,000 deadweight tons (DWT) and 25,000 DWT container vessels.

In terms of Phase II, the project will be built on Build-Own-Operate (BOO) / Build-Operate-Transfer (BOT) basis. The port will construct 9 additional berths including 4 container berths, 1 bulk cargo terminal, 1 grain terminal, 1 Ro-Ro terminal and 2 oil terminals. On the completion of Phase II, the port is expected to be capable of handling bulk carriers of more than 100,000 DWT and oil tankers up to 200,000 DWT. Thus, Gwadar Port which plays an indispensible role in the global shipping

network would become one of the world's most strategic deep-sea ports.

1.3.2 Master Plan of Gwadar Port

Concerning the Master Plan of Gwadar Port Project, several potentials have been approved and identified (Figure 1.3). As Gwadar News (2010) stated, it includes:

- Growth in trade volume between Balochistan and Iran;
- Potential increase in trade volume from Central Asian nations through Afghanistan;
- Increased transit and transshipment cargoes, especially liquid and dry bulk;
- Establishment of industries related to logistics, such as warehousing, assembly and distribution (Export Processing Zone i.e. EPZ);
- Development of petrochemical industries, oil storage and refineries etc.;
- Deal with regional shipping traffic flow.

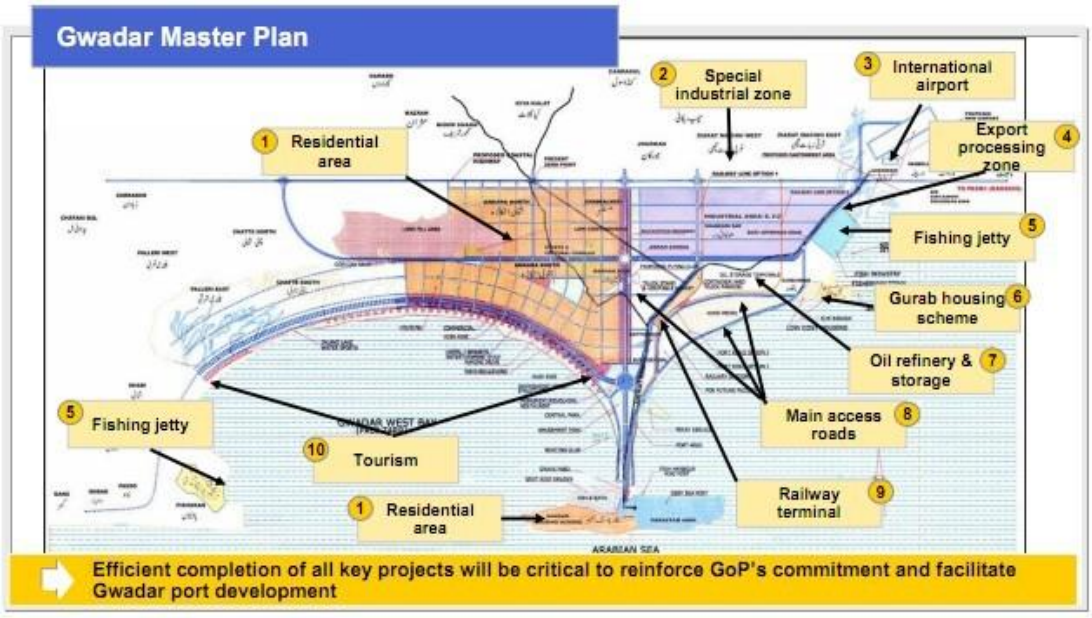


**Figure 1.3: Master Plan of Gwadar Port**

*(Source: Author D. Little (2006), Gwadar Port Master Plan – Implications for Energy Sector Development)*

## *1.4 China's Pearl in Pakistan's Waters*

Since 1988, the Reform and Open Policy proposed by Deng Xiaoping has promoted and accelerated the development of coastal (eastern) region of China. And as expected, coastal cities that are rapidly developed play an increasingly important role in international trade and economy, such as Shanghai and Shenzhen. In the late 1999, in order to bridge the apparent economic gap between eastern and western

part of China, Chinese government announced the China's Great Western Development Policy to initiate the western motive force and to accelerate the development of western China. However, as far as we know, a coastal position, which facilitates the access to global market, is an indispensible factor for successful development of eastern China. Therefore, one major obstacle to realize the China's Great Western Development vision is the geographic location of western China for it is far away from ocean.

For the sake of accelerating the openness of Western China, instead of further developing eastern ports of China, Chinese government has invested about $198 million in the Phase I of Gwadar Port Project. Meanwhile, another $200 million also have been contributed by China to the construction of Gwadar – Karachi highway. Apart from financial assistance, China has provided 450 engineers and technical expertise to complete the project. From the economic perspective, the main reason for China's involvement in the Gwadar Port Project is that the port will provide the landlocked Xinjiang region of China with access to the Arabian Sea (Ziad Haider, 2005), and then facilitate the openness of its market to the outside world. Moreover, the distance between western production centers and Shanghai Port or other eastern ports is approximately 3000 km, while merely 1500 km from western production centers to Gwadar Port (Pakistaniat Website, 2008). From this point of view, Gwadar Port is also beneficial for the implementation of the China's Great Western Development Policy. However, for better access to Gwadar Port, inland transportation and hinterland connection are of significant importance.

### 1.4.1 China's Overland Transportation Links with Gwadar Port

Karakorum Highway a.k.a. the "Sino-Pakistani Friendship Highway", as the major road connecting Western China with Northern Pakistan, starts from Kashgar city of Xinjiang province, via China and Pakistan border – Khunjerab Pass and ends at Thakot city of Pakistan. It was inaugurated and passed by truck by 1969.

From Figure 1.4 it can be seen that Kashgar is connected with other cities in Xinjiang Province of China by Southern Xinjiang railway which was opened in 1999. Then people and cargoes can be transported from Kashgar via Karakorum Highway to Rawalpindi which is located in the Pakistan's main road and rail network.


**Figure 1.4 Overland transportation links of Western China**

*(Source: The China Quarterly, 2006)*

Recently, China makes immense contribution to enhance lines communication with Pakistan. Moreover, in 2001, China promised to provide financial assistance for the expansion of Pakistan's transport infrastructure, especially rail and highway. The new railway line which connects Gwadar Port with Pakistan's main east-west rail link at Dalbandin is one part of Phase I. Not only does it link Gwadar with Bandar Abbas in the west, but also connect with Karachi in the east as well as Rawalpindi in the north. In addition, construction of a two-lane highway is another part of the project. This highway will start from Gwadar along the Makran Coast. Then, it will converge at Liari with Pakistan's Indus valley road and rail system. Parallel to Chinese enormous contribution to the Gwadar Port project is her endeavor to modernize Pakistan's rail system. By combining the construction of Gwadar Port with the modernization of railway system of Pakistan, China will greatly improve its ability to undertake the carriage of cargoes and people between its western inland area and the Arabian Sea via Pakistan. Meanwhile, such combination will also enhance the connection between Gwadar and Central Asian countries (John W. Garver, 2006).

Thus, China's effort to the construction of Gwadar Port and expansion of overland transportation links with Gwadar will accelerate the openness of Western China and further stimulate trade between Western China and the world.

### 1.4.2 Dry Ports in Western China

Given that the physical situation of Western China – thousand kilometers away from international shipping lines, lagging transport system and infrastructure – is the main

obstacle for its future development, Chinese government will construct dry ports to expand hinterland coverage and to drive economic development of western regions.

The inland city Chongqing, being located at the apex of the Yangtze River, is the economic core of this region. The combination of western and eastern part makes it the main development area of China's Great Western Development. Currently, Chongqing is endeavoring to construct western logistic center. And in February 2010, Chongqing Xi Yong Free Trade Zone with the largest space in China was inaugurated.

The dry port constructed in Chongqing City has several advantages. Above all, the development pace of Chongqing is rapid. As outward-oriented economy, Chongqing provides its logistic development with potent economy support. Moreover, as one of the six old industrial bases, the industry in Chongqing is strong. Exports of pillar industries products, such as automobiles, motorcycles and chemicals, are rapidly increasing. Apart from non-ferrous metals, nicotiana tobacco, electro-mechanics and chemicals produced in Sichuan, Yunnan and Guizhou Province also offer stable and plenty supplies to Chongqing. In addition, Chongqing is located at the convergence of the Yangtze River, Jialing River and Wu River, so it directly connects with six provinces and two cities along the Yangtze River. For land transport, it is connected to three trunk railways and nine state highways as well as two highways. Thus, high rapid economic development, abundant hinterland resources and favorable transportation system are beneficial for the construction and development of dry ports in Chongqing. And this imposes positive influences on the development of western China.

Additionally, there are also numerous logistics zones in Xinjiang province of China. In terms of Xinjiang province, it really plays an important role in improving inland logistics of China not only because of its relatively favorable economic status in the western part, also due to its strategic geographic location i.e. being adjacent to several countries as well as being connected with other countries through an array of railways and highways.

### *1.5 Research Question*

As described in the sections above China is investing in a huge way in the overland logistics. China is trying to have alternate logistic route in the western part in order to encourage economic development of the relatively underdeveloped western China. The first step towards development of this strategy is investment in Gwadar Port in Pakistan. And then it to connect the Gwadar port to the western part of China. This will not only provide connectivity to the western provinces of China but it would also provide an alternate route to China from Middle East and Europe. The role of

development of new dry ports in western provinces would be also an important factor in the new strategic development of China. So the main research question of the thesis would be:

**What is the importance of the Gwadar Port from the perspective of hinterland logistics of Xinjiang Province of China?**

The other sub-question for the thesis will be

- How important is the role of Gwadar port in this development of the overland logistics in China?
- How feasible is the development of the road and rail network through the hazardous terrain of the Karakoram?
- What is the expected growth in the western provinces of China and analyze the changing dynamic of the economy in the eastern and western part of China?
- What would be the role of dry ports in the development of overland logistics in the western part of China?

All the above questions above if answered would provide a more holistic answer to the main research question above.

**Data and Methodology**

The thesis would be a qualitative analysis of the feasibility of the various projects China is undertaking to improve its overland logistics in the western part of China. The data required to analyze the statistical trend would be required for the thesis. Also the data related to the network connecting the Gwadar port with the western part of China will be required.

The methodology used will be mostly qualitative analysis. It would consist of literature review of similar projects. It would consist of details of the projects. So a linkage would be developed to build an understanding of the various projects and their feasibility. SWOT analysis method will be adopted as the main part of qualitative analysis of this thesis. It will be utilized to analyze the internal and external factors that influence Gwadar Port development mainly from the perspective of China.

**Structure**

This thesis firstly analyzes the situation of economic development of China, especially the economic growth of western China, presenting economic background

for its logistics development. Then, it describes the situation of logistics development of China in details. Meanwhile, it displays various advantages and disadvantages of logistics development in the western part of China. Next, it mainly focuses on dry port development in China. On the basis of the above specific analysis, the thesis analyzes the strengths, weakness, opportunities and threats for Gwadar port development from the perspective of China by adopting SWOT analysis method. At last, the thesis mainly concentrates on geographical, economic and logistical environment of Xinjiang province, and further analyzes the importance of Gwadar port development from the point of view of Xinjiang province in China. It can be shown as the following figure:

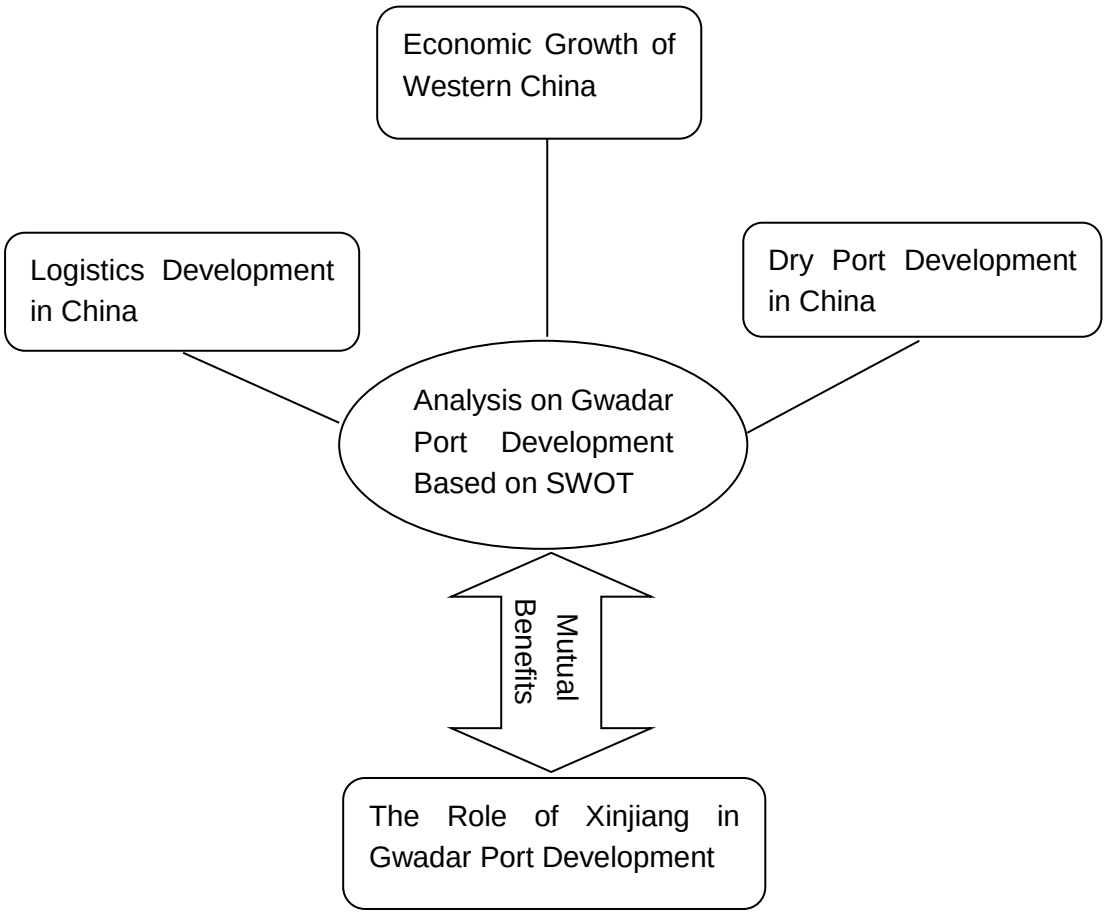


**Figure 1.5 Structure of thesis**

# Chapter 2 Economic Growth of Western Part of China

## *2.1 General Economic Development of China*

For the sake of invigorating economy, Chinese government accelerated the Pearl River Delta and the Yangtze River Delta's openness to the outside world by implementing the Development Strategy of China's Coastal Ports. Indeed economic development of these regions led to sustained and rapid development of national economy, with realizing the predetermined target. However, during recent decades, such a scenario also aggravated the economic disparity and inequality between different regions and different economic belts. It is obvious that this would exert adverse influences on the long-term economic development of China.

### 2.1.1 The Eastern Part of China

The eastern part of China is divided into three integrated economic area, namely the North coast, the East coast and the Southern coast. The North coast includes Beijing, Tianjin, Hebei and Shandong. The East coast comprises of Shanghai, Jiangsu and Zhejiang. The Southern coast is composed of Fujian, Guangdong and Hainan. Several factors – advantageous location, governmental strategic policies and investment – contribute to the prosperity of these regions.

The eastern part is the most developed region in China, whatever economy or technology. Generally speaking, approximately 36% population inhabits in this area of which Gross Domestic Product (GDP) accounts for 56% of national overall GDP. In addition, it generates 58% and 57% of added value respectively for the secondary Industry and the tertiary Industry. Per capita GDP is 23697 RMB, which is as much as 1.7 times of the national average.

The Yangtze River Delta, Shandong Peninsular, Beijing – Tianjin – Hebei and the Pearl River Delta make most of the contribution to the economic growth, especially the secondary and the tertiary industry. Per capita GDP is relatively higher than that of other parts. Shanghai, Beijing and Shenzhen have relatively strong economic capabilities in comparison with other cities. In Shanghai, the "Third – Second – First" industrial pattern initially forms. Beijing, as a central city, its added value of the tertiary industry is higher than that of Shanghai. From this, we could demonstrate that these highly developed cities put more emphasis on the tertiary industry development namely service industry instead of the primary and the second industry. Moreover, with rapid development of these regions, labor cost also increases. Thus, most manufacturers move to other regions, like the central and western part of China.

2.1.2 The Central and Northern Part

The central part consists of Shanxi, Henan, Inner Mongolia, Shanxi, Hunan, Hubei, Jiangxi and Anhui. The northern part includes Liaoning, Heilongjiang and Jilin. Th economic capability of these two regions is obviously weaker than that of eastern area. 32% of nationwide population in the central part creates 23% of national GDP. While in the northern part, merely 8.4% of total population inhabits there. GDP of the northern part occupies 8.7% of total GDP. The advantages of the primary industry in these two regions are relatively strong compared to that of the eastern part due to their plenty natural resources and vast lands.

2.1.3 The Western Part

The western part of China is divided into southwest and northwest. The southwest comprises of Yunnan, Guizhou, Sichuan, Chongqing and Guangxi, while the northwest includes Gansu, Qinghai, Ningxia, Tibet and Xinjiang. In comparison with other three regions aforementioned, economy of the western part is the least developed. With 23% of overall population, the western part only produces 13% GDP. In terms of per capita GDP, it is less than ten thousand RMB. And the primary industry is higher developed than other two industries.

In recent years, lower labor cost attracts more manufacturers to build factories in the western part in order to reduce production cost and to enhance competiveness in the international market. However, the regional development is always confronted with several obstacles. Above all, landlocked characteristic i.e. long distance to the ocean restricts the velocity of the openness of the western part, because under such circumstance it is difficult to popularize products in the international market. Moreover, inadequacy of infrastructure and insufficiency of transport further impose negative influences on the connection between the western part and other regions, hampering regional economic and technical development.

## *2.2 Economy of Western China*

10-year implementation of the Western Development strategy has significantly improved the economy of western China and stimulated its development pace through the support of government and cooperation with outside world.

Some related data (Xinhua Net, 2009) showed that the economy of western China has realized steady growth. From 2000 to 2008, the GDP of the west rose from 1665500 million RMB to 5825700 million RMB, with 11.7% annual growth rate which exceeded the economic growth rate of national level during the same period. This means gradually narrowed gap of GDP growth rate between the west and other

regions. Per capita GDP also increased from 4624 RMB to 16000 RMB. The overall scale of investment in the fixed assets increases by 2972800 million RMB, about 2% growth in the percentage of the national scale. Regional fiscal revenue grew from 112700 million Yuan to 515900 million Yuan, approximately 0.4% increase in the percentage of the national summation.

Meanwhile, the situation of inadequate infrastructure has experienced constant changes. During these 10 years (2000 - 2009), government continuously made enormous contribution to transport, water conservancy and communication infrastructure construction. Since 2000, summing up to 102 new major projects have been developed with 1700 million RMB investments. Infrastructure construction in the west has seen dramatic breakthrough. The first batch of key projects, like Qinghai – Tibet railway and the western section of national trunk road, West-East Pipeline and the West-East electricity transmission project, were accomplished in succession. 16000 kilometers national trunk road in the western part was completed. At the end of 2008, adding up to more than 8000 kilometers of railways were constructed. Total length of railroad lines in service is approximately 30000 kilometers. Aviation industry also developed rapidly. To the end of 2008, the number of civil airport reached 79, accounting for 49.4% of total number of national airports. 8 interprovincial trunk roads, roughly 18000 mileages were fully completed until 2010.

Deng Ping (2010), deputy director of the commission at the economic work conference of the National Development and Reform Commissions at all levels, stated that, in terms of 2009, the economic growth rate of western China was 13.4%, being 2.7% higher than that of eastern China. This demonstrated that the gap widening pace among various regions begun to slow down (Deng Ping, 2010).

### *2.3 Factors Influencing Economic Development of Western China*

As mentioned before, several obstacles hinder economic development of western China, such as geographic location and infrastructure construction. Zhang et al. (2002) adopted Interpretive Structural Model (ISM) to analyze the factors that influence economic development in Western China. They concluded that in order to develop Western China, basically the renewal of perception of people in the west plays an essential role. People in the west should grasp the opportunity to develop the west depending on their own wisdom and strength. And reasonable utilization of various domestic and foreign investments could not be ignored. Moreover, in terms of industrial structure, the percentage of the primary industry should be reduced, while vigorously developing the second and the tertiary industry. Meanwhile, the government should focus more attention on infrastructure construction. This includes not only transport and water conservancy etc. traditional infrastructure, but also modern infrastructure, such as information and communication. Apart from the

abovementioned factors, education and cultivation of talents are also of significant importance as well as the introduction of technology.

And in this part, the author will analyze the elements that impact economic development of Western China from natural environment, economic and social aspects in detail.

### 2.3.1 Natural Environment Factors

Poverty-stricken areas of Western China are mainly distributed in West Plateau, desert region, Karst environmental crisis zone and the Loess Plateau region with serious soil erosion. The common characteristics of these regions are harsh natural conditions, complex geological features, frequent natural disasters and fragile ecological environment.

Mountains and plateaus, of which elevation is mostly above 2000 meters, mainly concentrate in the western part. Either the global highest mountain i.e. Chomolungma or the biggest plateau – Tibetan Plateau – is located in the western part. Also, rough topography like Loess Plateau and Yunnan – Kweichow Plateau of which desertification is serious is situated in the west. Main mountains, plateaus, deserts, Gobi, bare rocks and permanent snow cover area concentrate in western China. Such complexity and specificity of landform and geology critically restrict agricultural and industrial development. What is worse, natural disaster like flood, drought, hailstorm and earthquake frequently takes place. Frequent occurrence of natural calamity incurs enormous economic loss, but also jeopardizes agriculture production, transportation, post and telecommunications and water conservancy facilities.

### 2.3.2 Geographic Location

Besides the disadvantages of natural environment, geographic isolation leads to high trade cost and low profits. Location disadvantage increases the difficulty for the western economic development. In particular, compared with the eastern coastal areas, the location disadvantage of western China is salient, mainly displaying landlocked, marginal and closed features.

The eastern part with flat terrain and fertile soil is suitable for agriculture production. But non-arable lands such as mountains, hills and deserts account for 98% of total land area. High population density of the eastern part leads to large social demand for market, while small social demand for market because of limited habitable space of the western part. Due to this factor, it is relatively cost-efficient to invest in the eastern part while more expensive in the western part. Under the market economy

conditions, independent and private investors consequentially prefer to make investment in the eastern coastal region rather than invest in the western inland area in terms of location option. Depending on its location advantage, eastern coastal area attracts both enormous domestic investment and foreign investment to develop processing trade and export production. However, such advantage and potential are not available in the western inland region.

Furthermore, ocean connections with some rapidly developed countries and numerous ports provide the eastern part with conveniences to communicate and trade with the outside world. Concerning the western part, landlocked inland and long distance from shoreline make it difficult to communicate with the outside world due to lagging transportation, communication and information technology. Although the western part implements various open-up policies which stimulate border trade, countries adjacent to the western border are underdeveloped and even backward. Consequently, this limits the west to expand markets.

### 2.3.3 Unreasonable Economic Structure

With the development of economy, industrial structure would also evolve. The secondary industry would gradually replace the primary industry and become dominant. Further economic development would make the tertiary industry capture the largest share of labor force, and would also lead to the shift of labor force from the primary industry to the third. On the basis of related data, the GDP of the primary industry in western China is higher than that of other regions, demonstrating that agriculture is still predominant in the west. However, the secondary industry provides the national economic development with material and technical foundation. It determines the development level and direction of regional economy. So investment in the west is lacking of efficiency.

Moreover, private enterprises develop slowly. And inflexible mechanism of state-owned business is difficult to accommodate to market change and development. Given western China, it is mainly dominated by state-owned economy. The above elements result in difficulty of achieving high economic growth. From above analysis, we can obtain that it is critical for the west to moderate the industrial structure.

### 2.3.4 Insufficient Infrastructure

The government once pointed out that infrastructure construction is the foundation of Go-West Campaign. And infrastructure inadequacy has always been a main constraint for the economic development of western China. It almost becomes “bottleneck”. Empirically, the optimal location for economic development is the

junctions and lines that connect cities to traffic arteries. Thus, priority to the development of transport and appropriately advanced construction of urban infrastructure are foundation for the implementation of the Great Western Development Strategy.

Landlocked feature is a major reason for the lagging economic development of the west. Additionally, undeveloped transportation system is the crux of this tricky problem. In the west, the percentage of the mileage of senior and sub-high class pavement account for merely 29.5%, 10.3% lower than the national average level and 20.8% lower than that in the eastern part. The mileage of highway in the west occupies only 0.3% of total road mileage, roughly 0.25% of highway mileage in the east. Standard high-level road above second class just accounts for 6.3% of road network. It is obvious that the coverage and expansion of road network in western China is seriously insufficient.

#### 2.3.5 Other Reasons

Domestic markets mainly agglomerate in the eastern part of China. However, because of population density and income level, the capacity of internal markets is relatively small. Except that, urban agglomeration and radiation effects significantly stimulate the mobility of production factors and the optimization of industrial structure. But the contradictory that urbanization process is lagging behind the industrialization process is more prominent in the west. Low level of urbanization means less communication and less trade between other regions as well as low degree of coordination and integration. Apparently, this to some extent affects the urbanization process and improvement of economic effects in the west. Besides, social factors, such as people's perception and innovation as well as education level, are necessary conditions that could not be ignored for the construction and openness of Western China. Musty ideas and low education level lead to the shortage of competent people. Obviously, this would seriously hinder the construction and development of Western China.

## *2.4 Relationship between Infrastructure and Logistics Development and Economic Growth*

The Council of Supply Chain Management Professionals (CSCMP, 2006) defines logistics as:

> *The process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements.*

Logistics, as an optimization process of a series of activities, not only could guarantee the move of cargo, but also could contribute to the development of Chinese economy by improving service level to attract cargo owners (Jiaqi Yang, 2009). He Guohua (2008) stated that logistics is the “source of third profit”. Li et al. (2009) also emphasized that logistics is considered as the artery and elementary industry of national economic development. However, in terms of the relationship between logistics development and economic growth, there are two main viewpoints, namely logistics-push and economic-pull, as Liu and Li stated (2007). Li et al. (2009) developed a mathematical model and found that before 2008, the development of Xuzhou logistics industry has effectively stimulated economic growth, yet since 2008, the logistics industry’s pull effect on the economy is not so obvious. But given the data, there are still some limitations of this model.

The relationship between logistics development and economic growth is interactional and synergistic. Logistics development will attract more cargo owners by facilitating and accelerating the delivery of freight. Thus, rapid logistics development could stimulate import and export as well as economic growth. Concerning economic growth, it boosts trade volume which requires more effective and efficient transport and delivery, so optimization and development of logistics are necessary. Thus economic growth pulls the development of logistics.

However, in addition to economic growth, the improvement of logistics infrastructure, equipment and information platform is also of important significance. Insufficient capacity of infrastructure could also make constraints on logistics development. For example, inadequate capacity of port would incur congestion and would further negatively affect port productivity. Port is a major node of logistics network, so inefficiency of port will restrain logistics development. Furthermore, unfavorable road and railway connectivity will increase transport costs and consequently will make logistics expensive. But on the other hand, logistics development also makes related departments focus attention on infrastructure construction and improvement.

## *2.5 Conclusion*

In general, economy of China has developed rapidly in recent years. Especially since the implementation of the opening-up and reform policy, cities in the eastern coastal region have seen immense changes and improvement. Although the fast and good development in this region to some degree improves the level of national economy, some constraints, especially economic disparity between different regions, restrain the whole level of economy. Backward western China makes constraints on the national economic development. There is a wide array of factors that influence and even hamper the western economic development. They are mainly wicked natural environment, disadvantageous geographic location, unreasonable economic

structure, insufficient infrastructure and low level of education. From the analysis of the relationship between logistics and economic development, they benefit each other. Logistics optimizes the process of delivering commodities between different stakeholders and even facilitates economic development. In terms of western China, lagging logistics industry and insufficient transport infrastructure are critical bottlenecks that hinter its pace of economic development. Thus, it is necessary and even urgent for China to improve its logistics system, especially the west part.

# Chapter 3 Logistics Development in China

## *3.1 General Situation*

### 3.1.1 Current Situation of Chinese Logistics Development

Since the opening-up and reform, China's logistics has improved significantly. On the one hand, warehousing area for commodities leaps into the front rank of the world. On the other hand, government increases expenditures on various transportation modes, such as railway, road, waterway, aviation and pipeline. During the "Ninth-five" period, investment in road construction increased by 4.5 times in comparison with that of the "Eighth-five" period. The mileage of railway added more than 6000 kilometers. Original lagging status of transportation infrastructure has seen immense change and has been improved significantly. Capacity of various transportation modes also greatly multiplies. Another progress is that the importance of logistics has been acknowledged and accepted by numerous enterprises and consumers due to government's positive promotion and improvement. Products' scale, category, form and related services have made great progress as well. Moreover, not only the number of corporations related to logistics service (for example, freight forwarder) has increased a lot, their service level also has improved. Additionally, the Third Party Logistics (TPL) enterprises go off to a flying start. Some logistics companies accelerate to construct information system and to establish e-commerce website relevant to logistics.

However, Chinese logistics is still in the traditional and primary phase of logistics. Logistics in China is confronted with a variety of inadequacies:

- On the whole, logistics is still not regarded as a strategic issue to improve operational quality of national economy and to enhance overall efficiency of national economy. In other words, investment and input are still inadequate.

- Links of logistics, including procurement, transportation, packaging, warehousing and distribution, are independent and fragmented economic activities, namely logistics in China has not yet formed integrated logistics. Lacking of integration results in low efficiency and high cost.

- Enterprises in China still lack logistical perception and right conception. Low degree of specialization is one of the trickiest issues for a few companies. Some enterprises even do not realize that improvement in logistics level could decrease cost, as "third source of profit". Shortage of these perceptions makes

the percentage of circulation expenditure accounting for total cost remain at a high level.

- In China, Third Party Logistics (TPL) develops slowly and supply chain management is just beginning. Thus, for China's logistics, it still has a long way to go. More time and more inputs are required for its sustainable development.

### 3.1.2 Transportation Infrastructure in China

China, as a developing country, even though its economy has experienced rapid growth and significant achievements, its logistics development and infrastructure construction are always lagging behind as well as being confronted with great challenges and pressures. Logistics bottlenecks would be most likely to restrict China's further growth instead of political pressure (John Kerr, 2007). Thus, it is rather urgent for Chinese government to carry out related feasible infrastructure construction projects with a vast of money and labor.

In terms of China's current logistics development situation, it is not that optimistic. John Kerr (2004) said that it would still take several years for trading with China to become as efficient as trading with Europe. Observers estimated that China's logistics costs are approximately three to four times higher than those in the developed countries, like European countries, North America and Japan. An estimation of a Hong Kong's General Chamber of Commerce was that logistics expenditure in China accounted for roughly 20% of GDP, being twice that of the United States. In order to improve the efficiency and effectiveness of logistics, Chinese government is always indeed making a huge contribution to develop ports and to optimize connectivity. By the end of 2005, it is estimated that the total mileage of transport network in China had reached 2.1 million kilometers, including 754000 km of railway and 1.93 million km of highway (Jin et al., 2010). At the mean time, China operated about 1000 ports. However, there still exist serious problems and tricky issues.

*Ports*

Even though world famous ports, like Shanghai, Shenzhen and Qingdao Port etc., of which throughput continuously ranked top, develop fast recently, the pace of port investment still could not keep abreast of the stable growth in both inbound and outbound freight volumes. Particularly, the advent of mega vessels exerts pressure on various conditions of some harbors. At some harbors, it will take larger ships a long time to berth. Long window time leads to congestions which seriously affects productivity and efficiency of ports and service level. Thus, it is rather necessary to

satisfy the requirement to accommodate larger vessels with deeper drafts. In addition, limited stacking area is another tough issue for ports especially facing up with the increasing import and export volumes. Therefore, except from efficiency gains and service improvements, further expansion and development of ports are urgent.

*Railways*

Even though rail is a major transport mode, it has not yet been adaptable to new trend of China's economic development. In terms of national railways, there are several problems.

Table 3.1 displays rail infrastructure development in China from 1985 to 2000. It is obvious that rail infrastructure development has seen great achievement since 1995. In spite of operating at almost full capacity from 1996 to 2000 (National Statistics of China, 2001), the national railways still could not satisfy the additional demands. Even more than 50% of freight still had to make utilization of alternative transportation modes like highways and inland waterways (EIU, 2001). John Kerr (2007) stated that China's railways would need to double capacity in order to deal with current requirement, because a chronic deficiency of capacity was critical restraint for railways in China. Insufficient capacity gave rise to uncertain departure and arrival time, making rail transport time-consuming.

**Table 3.1 Rail infrastructure developments of China**

| | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|
| Length of railways in operation (km) | 55000 | 57800 | 62600 | 68700 |
| Length of national railways in operation (km) | 52119 | 53378 | 54616 | 58656 |
| Length of electrified national railways (km) | 4151 | 6941 | 9703 | 14864 |
| As percentage of length of national railways in operation (per cent) | 8.0 | 13.0 | 17.8 | 25.3 |
| Length of national railways with double-tracks (km) | 9989 | 13024 | 16909 | 21408 |
| As percentage of length of national railways in operation (per cent) | 19.2 | 24.4 | 31.0 | 36.5 |

**Source: National Bureau of Statistics of China (2001)**

Moreover, poor coordination between different departments and sections as well as unproductive operation incurs bottlenecks and inefficiencies in rail system. Some worrisome figures showed that transport cost for the cargoes moved to inland of China was about 50% higher than that of Europe or North America. As a supply chain

practice director for consulting firm Capgemini, Shanghai-based Craig Rawlings (2004) said that delivering goods by rail between Shanghai and some western cities of China requires more than 18 days. Moreover, no intermodal capability and manual loading and discharging prolong total time of the whole process.

Given effectiveness and environmental benefits, railway is a favorable mode of transport for containerized cargoes, especially when containerization becomes a popular trend. However, China's railways are more suitable for bulk materials, like iron ore and grains, so they are unlikely to play a dominant role in transporting containerized commodities (John Kerr, 2007).

*Road*

Enormous effort has been made to build roads around coastal metropolises such as Shanghai and Shenzhen. John Kerr (2004) found that the best road network was concentrated around coastal cities, and even here roads conditions were variable in quality. Since 2004, a vast amount of money has been invested in road construction, but there was a trend of increasing bias towards the coastal cities in Eastern China. Nobody could deny the contribution to keep the logistics operations up with those of Europe and North America. However, it is far from sufficient, especially when the growth corridors start to extend westwards up to the Yangtze River and towards inland manufacturing hubs like Chongqing, as John Kerr (2007) stated. China's logistics landscape remains oversubscribed and clogged with inefficiencies. In order to eliminate such internal barriers and economic isolation, Chinese government focused more attention on the interstate highway network construction (JoPeng Yen Koay, 2004). As for Western China, the highway length has increased from 80000 km to 6500000 km by 2005 as government planned before.

It is said that since 1996, around 2/3 of governmental expenditures have been utilized to road network construction. However, Mark Goh and Charlene Ling (2003) demonstrated that despite the increase in highway length the rate of increase in highway length is generally much slower than that of increase in freight volume. Slow pace of construction is another barrier for logistics development. As for the west part of China, in the end of 1999, the total mileage of road in Western China was 532650 km. By the end of 2008, the total mileage of road has reached 1421087 km, including 16455 kilometers of highway. The density of roads is 20.61 kilometers per hundred square kilometer. The total mileage of road in the west in 2008 was about 2.67 times of that in 1999. And in comparison with the situation of pre-development of the west, the length of second-class highway increased by nearly 1.83 times. Table 3.2 shows the situation of inter-provincial highways of the National Trunk Highway System (east - west) in 2001.

**Table 3.2 Inter –provincial highways of the National Trunk Highway System (NTHS)**

| East – West Highways | Length (km) |
|---|---|
| Suifenhe (Heilongjiang) – Manzhouli (Inner Mongolia) | 1300 |
| Dandong (Liaoning) – Lhasa (Tibet) | 4600 |
| Qingdao (Shandong) – Yinchuan (Ningxia) | 1600 |
| Lianyungang (Jiangsu) – Horgos (Xinjiang) | 4400 |
| Shanghai – Chengdu (Sichuan) | 2500 |
| Shanghai – Ruili (Yunnan) | 4000 |
| Hengyang (Hunan) – Kunming (Yunnan) | 2000 |

**Source: EIU (2001)**

*Inland waterways*

Inland waterways in China have been developed significantly, particularly with the implementation of Three Gorges Dam project on the Yangtze River. From a long-term perspective, with the completion of this project, water level could be raised in order to improve the accessibility of Chongqing in terms of larger vessels by the end of the decade. Easy access to the inland city Chongqing would stimulate logistics development and would accelerate the openness of Western China

3.1.3 Existing Barriers that Restrict Logistics Development

First of all, even though China is a global plant with ample resources and vast land, serious disparity exists between different regions of China, namely China is not a homogeneous market. Jiang and Prater (2002) stated that there are actually at least two “countries” in China. Eastern coastal area is rapidly developed and highly modernized with a variety of metropolises, such as Beijing, Shanghai and Shenzhen. Per capita income of this region is much higher compared to that of other regions. What is more, people in this region are well educated. On the contrary, the interior of China is poorly developed with large population while rather low incomes.

Figure 3.1 displays that degree of urbanization of China by regions. It is obvious that cities in the east are highly urbanized, especially coastal cities in addition to Beijing. However, the process of urbanization for inland is relatively slow. From this figure, we

can see that urbanization of western China is the lowest, of which majority areas are slowly developed.


**Figure 3.1 Urbanization of China**

*(Source: McKinsey Global Institute, 2008)*

Gross domestic products (GDP) by region in China are shown in figure 3.2. Obviously, in 2004, the eastern coastal areas had relatively high GDP per square kilometer which fluctuated between one million and 1.5 million dollars. But the interior especially the western part was poorly developed, merely generating around ten thousand dollars GDP per square kilometer.

Unbalanced development status seriously hampers logistics development in China, because it is difficult to form an integrated national distribution system. Extensive geographic area but varied income levels lead to numerous small distributors which focus on some certain commodities. For the purpose of covering more extensive area, suppliers require to do business with these small distributors. Such fragmented distribution network generates difficulties in attracting outside products, restraining the opportunities for local logistics development.

Moreover, Guan Xi, literally being interpreted as “relationships”, is another factor seriously hindering China’s logistics improvement. Connections with related companies and relevant organization offer various conveniences for one corporation to do business, since from Chinese point of view this means trustworthiness which minimizes risk and troubles. Without Guan Xi, not only for foreign enterprises, even for native companies, it is difficult to do business. Meanwhile, building connections

with government cannot be neglected, especially when companies deal with local offices.

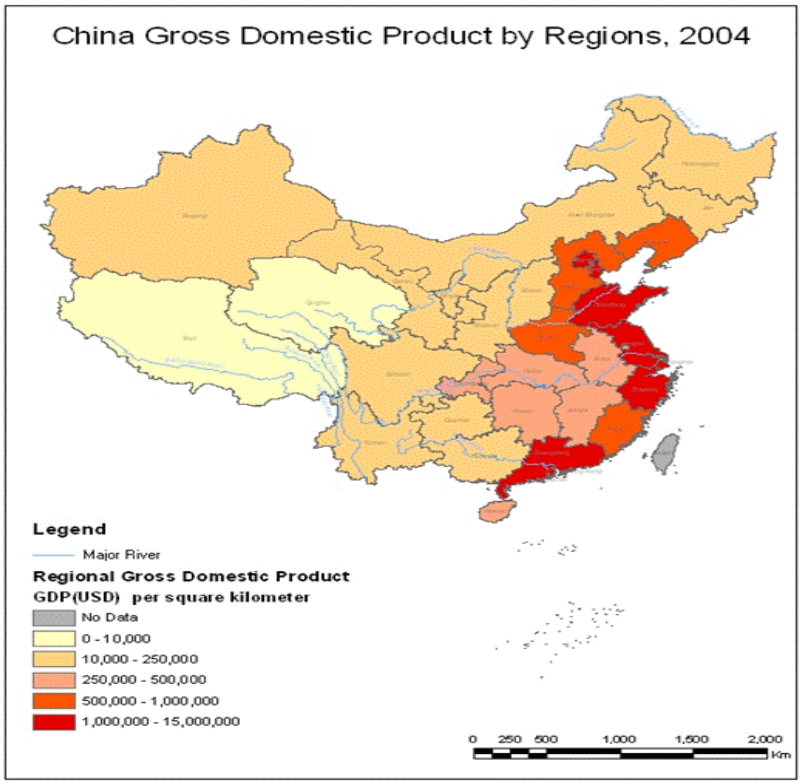


**Figure 3.2 China Gross Domestic Products of each region, 2004**
*(Source: Harvard Business School, 2006)*

Eventually, regional protectionism, as political and legal barrier, exerts adverse influences on logistical development of China. Government intervention seriously hampers participation of various players in the supply chain, and further leads to fragmentation of distribution market. In fact, provincial and municipal logistics cost is rather expensive, because there are tariff and nontariff barriers to prevent outside products from entering in order to protect local markets. And vast geographic area and underdeveloped infrastructure deteriorate this issue. Apart from two aforementioned catalysts, decentralization also aggravates this problem, since majority state-owned companies are controlled by local governments which merely focus on “local economic growth, employment, social stability and tax revenues” (Jiang and Prater, 2002). A series of barriers between provinces and cities separate national distribution network, and incur high cost for supplying and distributing commodities.

### 3.1.4 Future and Opportunities

For China, its future logistics development is confronted with a wide array of favorable opportunities:

Rapid development of national economy raises higher and more urgent requirements on transportation and logistics. In particular, as the workshop of the world, China is competitive when we take labor cost into consideration. However, some other emerging nations with low cost impose threats and pressure on China. Moreover, logistics cost accounts for high percentage of total cost, playing an indispensible role in controlling and reducing overall expenditure. In order to enhance competitiveness, China needs to strengthen logistics section to reduced logistics and low price. According to Jiang and Prater (2002), more sophisticated demands of Chinese consumers – more extensive commodity categories, higher quality and better service – make more sophisticated demands on distribution system and logistics capability, continuously optimizing and improving logistics system. Booming economy stimulates the optimization and modernization of China's logistics.

Entering World Trade Organization (WTO) gives an immense impetus to modern logistical development, functioning as catalyst. Since China entered WTO, China's economy has been intimately linked with global economy, and more foreign investments have been made in China's various industries. On one hand, this significantly pushes forward the growth in China's import and export trade, providing fresh opportunities for its logistics development as well as offering more extensive demands for logistics market. On the other hand, China's logistical operation synchronizes with international norms after entry of WTO, accelerating the modernization of logistics. Furthermore, due to WTO entrance, China has to abolish some regulations and rules that protect local logistics and restraint the entry of foreign enterprises. For example, foreign corporations can utilize their own warehouses and facilities to transport goods as well as distributing commodities. Moreover, 100% ownership is allowed for foreign companies by eliminating constraints on foreign equity. In addition, according to Jiang and Prater (2002), foreign enterprises could also provide certain services relevant to logistics, like freight forwarding and international carriers. From this point of view, this gives numerous corporations greater freedom, and better optimizes modern logistics of China.

Appearance and development of E-commerce make higher demands on transportation and distribution, which lead the logistics to a new phase. However, currently, e-commerce logistics seriously falls behind the development of e-commerce website, becoming "bottle neck" for the development of E-commerce.

However, development of e-commerce website leads to growth in the use of Internet, and further offers “a practical broadcast medium” (Jiang and Prater, 2002) for companies. Thus, this provides China’s logistics development with huge potential. Logistical distribution system should accommodate E-commerce which possesses all sorts of advantages, such as broad range, multiple options, high speed, low cost and related assorted logistics services. In the future, E-commerce will be important impetus to drive China’s logistics improvement.

The Western Development Strategy Policy offers a novel opportunity for China’s logistics. Implementation of such strategic policy is bound to incur growth in domestic and international trade volumes, which expands space for the evolution of China’s logistics. Meanwhile, poor logistical infrastructure in western region increases investment chances for logistics enterprises.

Numerous corporations are urgent to lower logistics cost in order to enhance competitiveness. Through the restructuring of enterprises, their perception upgrades gradually. Originally, saving raw materials was regarded as the source of profit, and then reducing human resource cost was the second source of profit. Now, reduction in logistics cost is the “third profit source” (Ding, 2011).

## *3.2 Logistics Development in Western China*

### 3.2.1 Potential Advantages

With extensive land resources, Western China will satisfy the demand of logistics system which needs vast land occupation for exploitation. In addition, Western China possesses ample mineral reserves, goods and materials and tourism resources, which provides important and necessary material basis.

Plentiful and inexpensive labor resources can engage in constructing physical infrastructure of logistics. Education institutions in the west can cultivate and train competent people for logistics operation and management.

Under the guidance of strategic development of Western China policy, construction of communication and transportation infrastructure should be given priority to develop as one of the essential and basic projects. Southern Xinjiang Railway, Lanzhou – Xinjiang Railway, Highway network on the Plateau and railways under construction, intermodal system are beneficial for logistics development in the west as well as offering solid preliminary foundation.

Meanwhile, logistics development along the eastern coastal cities functions as

catalyst for western logistics development, of which experiences and lessons are worth considering and learning.

### 3.2.2 Disadvantages

*Poor geographical environment*

Geographical environment in western China is special, directly affecting western economy and logistics development. In terms of transport modes, the west depends more on road and railway. Especially in recent years, more and more cargoes are transported by road. However, geographic situation leads to high cost for the construction of roads and other physical infrastructures. Shortage of high-level roads, steep bank and a lot of bends are tough issues for road network in the west. Weak logistical infrastructures and poorly developed transport system are main elements that constraint western logistics development. Besides, due to wicked natural conditions and fickle climate, terrain landslide and collapse sometimes take place.

Under such circumstance, safety, punctuality and cost control of logistics are confronted with a variety of challenges. Poor pavement quality incurs various problems, such as increase in the rate of breakage, serious abrasion of vehicles, more traffic accidents and increasing mechanical breakdown. In terms of time, fickle climate gives rise to uncertainty of operation, directly influencing the punctuality of distribution. Apart from safety and punctuality issues, restrictions on loading capacity results in growth in logistical cost.

*Economic environment*

Obvious economic disparity exists between the eastern coastal region and the western area, which leads to fixed cargo category and direction, namely energy and minerals are main bulk cargoes to the east, while light industrial products and industrial products to the west. Simultaneously, there is regional unbalance in the west. Apparent asymmetry exists between big cities or between big city and small and medium cities. Restraints derived from cargo worthiness of vehicles incur less return cargoes, high transport costs for single trip and difficulty in predicting return time.

In addition, product structure also exerts adverse influences on logistics development of western China. In comparison with the eastern region, there are fewer commodities with strong international and domestic competitive power in the west. On the contrary, products there are unitary. Seasonality and regional divergence are main characteristics of products in the west.

*Cultural environment*

In addition to geographic environment and economic situation, cultural environment influences western logistics development as well. Compared to logistics development in the east, western logistics develops relatively late. As for logistical perception, there is excessive disparity between these two regions. More serious inadequacy of talents and relatively backward logistics technology and facilities are tricky issues for western China.

## *3.3 Conclusion*

In this chapter, the author analyzes the status of logistics development in China, especially western China. Logistics development of China is confronted with several problems, such as inadequate investment and input, shortage of logistical perception and fragmented logistics system. Even though in recent years, China invested enormously in the construction of various transport infrastructures such as railway, highway, ports and pipelines, its pace of development still could not catch up with the pace of growth in trade volumes. The capacity of transport infrastructures even could not accommodate the market demands. For Chinese logistics, several elements restrict its development and optimization. Unbalanced development between the east and the west is the most important reason. Low urbanization of the western part limits the development of the whole national logistics. “Guan Xi”, known as relationship, affects foreign direct investments. Also, regional protectionism increases logistics cost of interprovincial trade and business. However, the entrance of WTO ten years before, the advent of E-commerce and the Western Development Policy create potential opportunities for Chinese logistics development. As for logistics in western China, it also possesses several advantages and disadvantages which influence its development. Actually, the west of China has various potentials to optimize distribution network, like vast lands, low labor cost and governmental policies. But poor natural environment, lagging economy and cultural environment propose several issues for its development and even to some extent restrain its pace of development.

# Chapter 4 Development of Dry Port in China

Since 1960s, the advent of containerization has brought about numerous advantages for transportation, and has also significantly stimulated the development of transportation. However, everything has two sides. In spite of the benefits it generates, the rapid increasing container volumes incur certain inconvenience for turnover at terminals, i.e. the ever larger traffic flows caused by container transportation lead to congestion at ports and their surroundings and further adversely affect productivity and efficiency of terminals. Moreover, the majority of ports are located in urban area or cities, so the expansion of ports' space and capacity is constrained by the scarcity of available land. Meanwhile, carbon dioxide emissions, water pollutions and other environmental issues which are increasingly serious impose unfavorable influences on the expansion and development of seaports. Under such circumstance, dry ports obtain growing focus. Being constructed in the hinterland network, they are expected to be capable of addressing these issues and to be feasible for the sustainable development of ports.

In this chapter, the author will first specifically analyze the reasons for dry ports' development, and then introduce the concept of dry ports from two perspectives. Analysis of dry ports' functions and advantages is following. At last, Chinese dry port development situation will be generally introduced.

## *4.1 Reasons for the Development of Dry Ports*

Continuing growth in container volumes conduces that efficient and cost-effective hinterland connection is progressively essential for ports to enhance their competitiveness, especially when they are confronted with fierce competition nowadays. Moreover, current global logistics strategies shift emphasis on inland transport in order to solve capacity and efficiency problems. Dry ports, functioning as seaports in inland area, play an increasingly critical role in a supply chain.

As Notteboom and Rodrigue (2009) stated, there are three main factors that drive the development of dry ports, namely complex modern freight distribution network, more and more application of intermodal transport and limited capacity. The following contents will specifically analyze the reasons for the evolution of dry ports from three perspectives, namely international container logistics development, regionalization of ports and ever-larger vessel size.

### 4.1.1 Requirement for International Container Logistic Development

During the last 10 years, transportation activities related to container transport have increased impressively. According to the data related to annually reported global container traffic flows, container-related transportation activities are still on growth trend. Moreover, Robinson (2002) and Marlow (2003) stated that instead of port-to-port transport solutions, providing door-to-door services has also been developed for organizational and technological changes. In order to improve the efficiency and economic benefits of transport chain and to realize door-to-door transport, intermodal transport has been gradually developed. European Commission (2000) defines intermodal transport as:

> *"There is a consensus that intermodal transport constitutes a transport process in which two following conditions are fulfilled: Two or more different transport modes are deployed; and the goods remain in one and the same transport until for the entire journey."*

Intermodal transport, a multimodal chain of containerized transportation activities, combines truck, rail, ocean shipping and river navigation to transport containerized cargoes. Optimization of utilization of the respective major strength of various transport modes makes containerized intermodal transportation play an indispensible role in international movement of commodities and connect the initial shipper with the final consignee. For example, rail transport can carry massive quantities of cargoes over long distance and truck can realize door-to-door and fast services. According to European Commission (2000) and Rutten (1998), intermodal transport has the following advantages: less energy consumption, reduced congestions on road corridors, and decrease in adverse environmental influences and reduction in domestic transport costs.

However, in order to guarantee that the intermodal transport network functions well and productively in terms of transshipping containers, related infrastructure and facility are necessary. Apart from the terminals of the initial and final seaports where containers are transshipped between ocean shipping and land transportation, inland terminals which provide transshipment services between land transport modes are increasingly significant. According to DoT (1997), inland terminals, namely dry ports, function as seaports in inland for transferring containers between rail, truck and river navigation for import or export purposes. In addition to transshipment, dry ports undertake various services such as consolidation, maintenance of containers, temporary storage, trace and track as well as custom clearance. Thus, in the intermodal transport network, dry port acting as an intermodal node will efficiently link different transport modes as well as ensuring smooth traffic flows. In particular, currently seaports, as gateways, are confronted with numerous challenges and tough

issues, such as scarcity of available land, serious congestions at gates and environmental pollutions which hamper the efficiency of transport and even whole supply chain.

### 4.1.2 Requirement for the Regionalization of Seaports

Globalization of production and consumption allows manufacturers to make full use of comparative advantages on one hand, however, results in fierce international competition and reduced profits for many industries on the other. In this context, logistics to some extent would improve production efficiency. But long distance and fragmented market conduce that “no single locality can service efficiently the distribution requirements of a complex web of activities (Notteboom and Rodrigue, 2009)”. Under such circumstance, in 2005, Notteboom and Rodrigue proposed port regionalization which means that ports have go further into inland area and expand the hinterland. It contributes to logistics integration; and allows more quick and efficient correspondence to fragmented production and consumption system. Meanwhile, port regionalization also circumscribes local constraints like shortage of land for expansion and diseconomies of rail and truck etc. issues which undermine port’s growth and efficiency by externalizing them (Notteboom and Rodrigue, 2005).

In order to implement port regionalization, dry port is indispensable since, as an inland freight distribution center, it facilities seaports to expand geographical scale and permits more quick and efficient connection with inland freight distribution network as well. As Notteboom and Rodrigue (2005) stated, the port regionalization mainly displays following features: interdependent functions and combined development of a load center and multimodal distribution platforms. These characteristics ultimately result in the formation of a regional logistics centre and regional distribution network within its hinterland coverage.

Dry port, as a movement of seaport into inland, provides a more convenient platform for various trade and commercial activities as well as better connecting different stakeholders, shippers/consignees and carriers/shipping companies in the supply chain. Moreover, the establishment of related inland networks allows easier access to hinterland area and attracts more supplies of cargoes for seaports. In the mean time, enlarged hinterland coverage enhances seaport’s competition with imminent ports. Thus, with the expansion of hinterland coverage, dry ports play an important role in port regionalization.

### 4.1.3 Requirement for Increasing Vessel Sizes

In recent years, the size of container vessels has experienced impressive increase in

order to fully deploy the advantages of economies of scale which leads to reduction in shipping cost. However, ever larger vessels impose numerous challenges on seaports and inland infrastructures development.

For seaports, especially main gateways, a wide array of issues derive from increasing vessel size. Significant increase in vessel size results in large quantities of containers which exert great pressures on the limited available capacity of terminals and stacking area of seaports. With the advent of mega ships, deepwater requirements become more demanding. This will seriously affect the accessibility of seaports and further impair ports' competitiveness. Moreover, massive quantities of containers put heavy burdens on local road and rail system, for example, serious congestions on road corridors. Additionally, environmental issues are deteriorated because of increasing congestions on roads generated by large quantities of containers.

From the perspective of seaports, it is necessary to construct dry ports which undertake port-related operations in inland area. Implementation of dry ports will help alleviate situations aforementioned with which seaports are confronted. Therefore, it is obvious that increasing vessel size is another element stimulating dry port development since dry ports are of important significance for the sustainability and efficiency of seaports.

### *4.2 The Concept of Dry Port*

Dry ports have been developed in Europe before they were introduced into China. In 1966, Rivalta Scrivia was constructed for transshipment of cargoes of Genoa Port in Italy. The notions of dry ports differ from country to country. In France, they are named platforms logistiques while Gueterverkehrszentren (GVZ) in Germany. Italians call them Interporti but freight villages in the United Kingdom. They are rail service centers in the Netherlands. In Japan, Singapore and the United States, they are named logistic centers in general. They are also named like inland terminal, intermodal freight station and hinterland ports etc. Even though the specific concepts of these notions have subtle variations, they all emphasize the function of transshipment.

In foreign countries, the dry port concept is based on a seaport which is directly connected by rail with inland intermodal terminals where containers can be handled and delivered in the same way as if they were in a seaport (Roso et al., 2009). Not only do they serve the local area, but also provide services to the region. It has higher priority than any other logistic nodes in the same region. Dry port transships containers between different transportation modes as well as offering additional functions such as storage, custom clearance, maintenance and repair and other

value-added services.

In China, there are also various definitions of dry ports. Generally speaking, dry ports refer to logistic centers which carry the functions of seaports like warehousing, maintenance and repairing, customs clearance, assignment of bills of lading etc. in inland area. In comparison with that of foreign countries, definition in China refers to that corridors that dry ports are connected to seaports can also be highway network or inland waterways in addition to rail network.

### 4.2.1 As an Intermodal Node

According to Roso, Woxenius and Lumsden (2009):

> *"A dry port is an inland intermodal terminal directly connected to a seaport, with high capacity traffic modes, preferably rail, where customers can leave and/or collect their goods in intermodal loading units, as if directly to the seaport."*

This definition of dry port is based on the movement of intermodal terminals further into hinterland from the port areas. Dry ports, located in inland regions, carry out a series of functions, including loading and unloading of cargoes, intermodal transport connectivity and value added services.

As an intermodal node, above all, dry port acts as a nodal point for seamless linkages between different transport modes and transshipment of containers. And then, scheduled and dedicated rail and road networks that connect a dry port with a seaport or a dry port with other logistics centers in hinterland. Moreover, functions that dry ports carry out also include warehousing, consolidation and distribution, maintenance of containers, cargo storage and custom clearance as figure 4.1 displays. From this figure, it is obvious that with the implementation of dry ports, senders and receivers can consolidate and distribute cargoes at inland locations. On the one hand, acting as an intermodal node, dry port contributes to hinterland expansion and to some extent address numerous tough issues of seaports. On the other hand, dry port facilitates transaction activities between shippers and consignees, namely providing an efficient and cost-effective connection between two participants in the supply chain, as well as enhancing logistics integration.

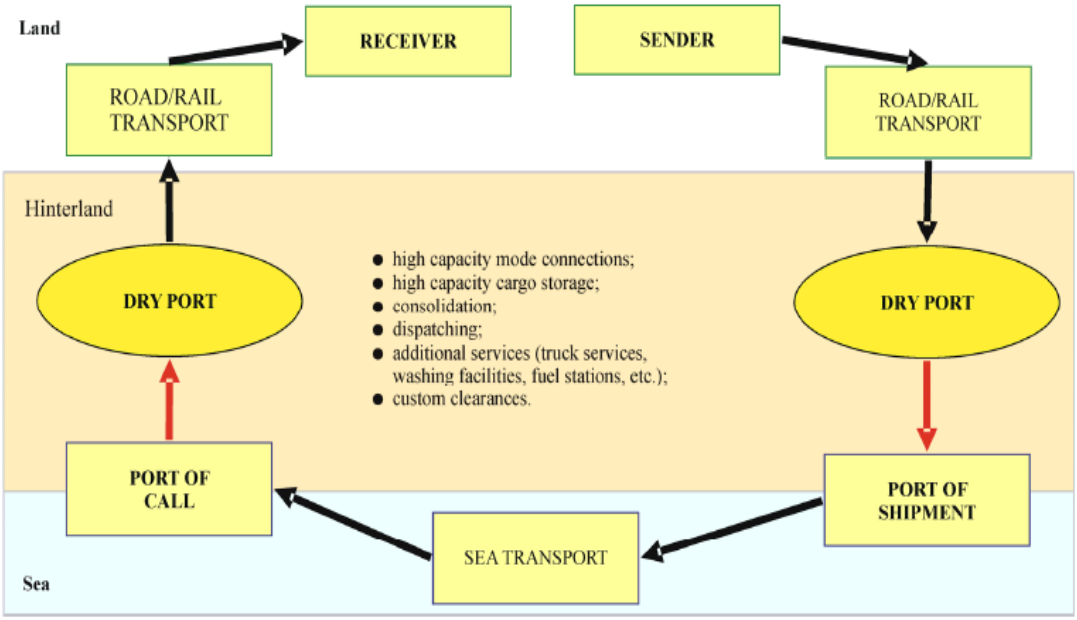


**Figure 4.1 Dry Port in the transport chain**

*(Source: BENTZEN. L, Strategic business networks in the tranpsort sector – new opportunities)*

4.2.2 From an Environmental Perspective

Figure 4.2 shows that in comparison with conventional hinterland transport network, the implementation of dry ports in the hinterland results in the decrease in the number of transport linkages from/to the seaports. Meanwhile, with the establishment of dry ports, seaports' terminal capacity expands and they can accommodate mega ships. In addition, rail connection between seaports and dry ports reduces congestions at seaports and their vicinities significantly. According to Roso (2007), in Europe, one train can replace 35 lorries. Reduction in the number of lorries leads to reduced congestions on the road apart from lowering environmental pollution, carbon dioxide emissions in particular.

Roso (2007) utilized model and simulation to estimate CO2 emissions with and without the implementation of dry ports. Consequently, with the establishment of dry ports, the calculated carbon dioxide emissions decrease by 25% compared to the emissions without dry ports. From this viewpoint, development of dry ports is beneficial for environmental protection, especially nowadays environmental issues become increasingly serious and tricky.

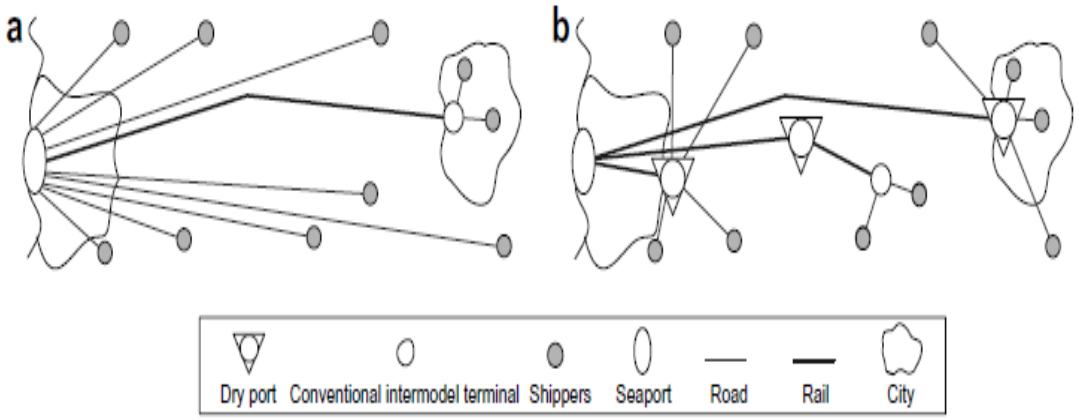


**Figure 4.2 Hinterland transport without (a) and with (b) dry ports**
*(Source: Roso (2007), Science Direct)*

## *4.3 The Function and Advantages of Dry Port*

4.3.1 The Function of Dry Ports

For different players, the function of dry ports differs. Dry ports are freight station for commodity trade as for clients. For port enterprises, dry ports are pivotal tools for expanding port space and hinterlands. And concerning inland regions, dry ports are stimulant for economic development.

By studying and investigating a dry port in South Africa, the City Deep container terminal, Cronje et al. (2009) summarized that a dry port mainly carries out the following functions: transport, other functions, customs and value added services. Transport function refers to import and export containers from/to dry ports via road and rail connections. Other functions include handling of containers, long and short storage of containers, internal road networks, buffer between different transport modes and custom clearance. Border police and customs have to undertake the inspections of related documents and avoidance of the occurrence of fraud and irregularities. In terms of value added services, packing, quality control, maintenance and repair of containers are provided at dry ports.

Specifically speaking, as important logistic nodes, dry ports connect seaports with extensive hinterlands as a whole supply chain. Not only do they expand the sources of cargoes, but also stimulate the development of inland logistics due to decrease of corporative logistic costs. Their main functions are as follows:

- Comprehensive logistics services: storage, processing, labeling, repacking,

classification, allocation and other specialized services;

- Inland terminal function: setting up customs, quarantine, and inspection departments which provide customs clearance to customers;
- Containers distribution, storage and management: transfer of import and export FCL, storage, stacking, stripping and stuffing, tallying, consolidation etc;
- Freight forwarding: contracting transportation services in the domestic market, accepting and delivering cargoes, issuing bills of lading, managing containers, dealing with customs declaration and intermodal transport services;
- Management information system and exchange data and information: tracing and tracking of containers and vehicles, receiving, processing and transmitting documents, timely providing relevant information to customers;
- Dedicated rail service: organizing rail services and offering door-to-door service to consignees;
- Other services: maintenance and repairing of vehicles and facilities as well as insurance services.

### 4.3.2 The Advantages of Dry Ports

Dry ports exert impressively advantageous impacts on the development of seaports as well as significantly stimulate the development of seaports. Jar emskis studied 84 companies related to transportation including storage, shipping, rail, and agencies and so on. Through questionnaires, he found that the merits of dry ports display in various aspects, but the following three advantages are publicly acknowledged:

- Dry ports significantly relieve the transport congestion and to some extent eliminate transportation bottleneck at seaports;
- Dry ports enhance the implementation of intermodal transportation, which improve the efficiency of transportation logistic;
- Dry ports strengthen the connection with seaports by making utilization of a common freight station.

Dry ports are transshipment nodes in the port networks. They undertake the function of collection and transportation of cargoes from seaports. Dry ports play a pivotal role in the hinterland transportation. Their accessibility and distribution function directly influence the hinterland scope of seaports they are connected to. Implementation of dry ports will strengthen the seaports' competitiveness for hinterland expansion.

The implementation of dry ports optimizes and improves the inland transportation system. Through fully and effectively utilization of rail transportation, hub ports are connected with feeder ports through rail network; feeder ports combine rail and road transportation; dry ports spread to inland hinterland through road network. Dry ports generate certain attractiveness and radiation scope, which build simple and direct

connection between seaports and inland area.

Export containers are accumulated at dry ports and then transported to seaports by scheduled and dedicated rail network when they reach certain scale; import containers are transshipped by rail to dry ports and then carried by trucks to customers. Container transportations between dry ports and seaports are coordinated by seaports or shipping companies. They adopt dedicated rail transportation with fixed schedule which provide more accurate delivery time to consignees and seaports. This absolutely will improve the service level of seaports and satisfy the customers. Through the implementation of dedicated rail transportation, combination of rail and road transport between seaports and hinterland not only effectively takes advantage of economies of scale of rail, but also alleviates the pressure generated from traffic congestion and environmental pollutions like carbon dioxide emissions at seaports.

For different participants in the supply chain, the implementation of dry port will bring about different benefits. Table 4.1 summarizes the potential advantages generated from the implementation of dry ports from the perspectives of seaports, seaport cities, rail/road operators, shippers and society.

**Table 4.1 Potential benefits derived from the implementation of dry port**

| Potential advantages generated by dry ports | |
|---|---|
| Seaports | Reduced congestions at seaports and its vicinity<br>Increase in terminal and storage capacity<br>Hinterland expansion |
| Seaport Cities | Less congestion on road corridors<br>Sufficient utilization of land |
| Rail Operators | Deployment of economies of scale<br>Obtain more market share |
| Road Operators | Reduced time loss in queuing at terminals and congested road |
| Shippers | More convenient access to seaport<br>Green marketing |
| Society | Lower adverse influences on environment<br>Higher employment and more job opportunities |
| *Source: Roso (2009)* | |

## *4.4 The Categories of Dry Port*

4.4.1 Distant, Midrange and Close Dry Ports

According to Roso (2009), dry ports are categorized into three kinds based on their functions and distance to seaports, namely distant dry ports, midrange dry ports and close dry ports. Relatively, due to more and more serious congestion and environmental issues which seaports are confronted with, close dry ports come into existence. However, in terms of distant dry ports, they are implemented mainly from the cost effectiveness perspective i.e. rail transport will save impressive transportation cost instead of truck transport for long distance transportation. Rodrigue et al. (2007) suggested that close dry port can be named satellite terminal from which the distance to seaport should be less than 10km, while the distance between distant dry port and seaport should be more than 300km.

***Distant dry ports***

Distant dry ports which are the most traditional pattern of dry ports have a long history. The reason for the advent of distant dry ports is the significant advantage of rail transport in terms of large volume and long distance transportation. Thus, cargoes are transported by rail from seaports to dry ports, and then carried by truck from dry ports to customers which realizes the door-to-door transportation, which save the overall logistic costs.

In terms of land transportation, compared to other modes, rail is optimal transportation mode for cargo carriage with large volume and long distance characteristics. On the basis of some statistics, one train can replace 35 lorries in Europe and 100 lorries in America. Given the rapidly increasing trade volumes and limited space of seaports, hinterland connection by rail transport will avoid long waiting line and reduce congestion at seaports. Meanwhile, instead of truck transport, rail transport will decrease carbon dioxide emissions and further reduce the adverse influences on environment. As for port cities, reduction of traffic jam is beneficial for improvement of city surroundings and living standard.

***Midrange dry ports***

Midrange dry ports play as buffers of time and space for seaports that dry ports are connected to.

***Close dry ports***

Large traffic volumes in hub ports will significantly affect the cities and city clusters in

which hub ports are located. In order to alleviate traffic jam, road carriers of long distance transport prefer arterial priority schemes, dedicated streets or improve productivity at ports. Despite the measures aforementioned, another feasible method is to construct close dry ports around the city. Cargoes are collected and distributed at close dry ports, then transported to customers or ports through dedicated rail network. Thus, traffic flows at port are reduced by transferring large traffic volumes to close dry ports around the city.

### 4.4.2 Feeder and Hub Dry Ports

Based on the dependence relationship between dry ports and seaports, dry ports are divided into two categories: feeder dry ports and hub dry ports.

***Feeder dry ports***

Feeder dry ports are defined as the feeder ports of seaports, namely the inland extension of seaports hinterland. Generally speaking, feeder ports, which have at least one transport mode and undertake the functions of “customs, quarantine and inspection”, are primary development of dry ports. Alleviation of pressures of customs at seaports is their main target.

***Hub dry ports***

Hub dry ports are referred as seaports mitigation into inland area. Being dependent on the land transport network, hub dry ports, as seaports, engage in loading and unloading international and domestic cargoes. They are as important as seaports.

### 4.4.3 Continental and Inland Dry Ports

***Continental dry ports***

Continental dry ports, located in the continent, are far away from shipping network. They connect with seaports on the reliance of land transport system, like inland city Xi’an in China.

***Inland dry ports***

Inland dry ports, situated in maritime network, possess port and terminal facilities. They merely provide hub seaports with cargoes in order to stimulate the development of both seaports and regions where dry ports are located. For example, Beijing dry port is at the beginning of the Grand Canal.

## *4.5 The Situation of Dry Port Development in China*

Recently, dry ports also have been established in China, but they are still in developmental stage. There are mainly four dry port clusters: dry port groups in Bohai Rim Region, in Northeast Region, in Jiangsu and Zhejiang Coastal Area and in the Pearl River Delta.

In 2002, the first Chinese dry port was jointly constructed by Beijing Government and Tianjin Port Authority in Beijing. From then on, a number of dry ports have also been established in various regions. Due to major seaport cluster along the eastern coast of China, there are three groups of dry ports, respectively situated in the northeastern China, middle and eastern China and southern China. These three dry ports clusters have been formed in order to provide services to Dalian, Tianjin, Ningbo and Shanghai Ports.

In Zhejiang Province and its surroundings, five dry ports have been built depending on the port of Ningbo, namely Jinhua, Yiwu, Shaoxing, Yutao and Quzhou. In 2010, the total throughput of the five dry ports was above one million TEUs. It facilitated shippers of this region on one hand, but also improved the competitiveness of Ningbo Port to outstand from fierce competition with neighboring mega port of Shanghai on the other.

Likewise, 12 dry ports have also been established to serve the port of Tianjin. Similarly, construction of these 12 dry ports led to significant increase in throughput. In the northeast part of China, such as Heilongjiang Province, Jilin Province and Liaoning Province, seaport operators collaborate with local authorities to construct dry ports. For example, the Port of Yingkou and Shenyang City have worked together to build one dry port in Shenyang. Meanwhile, for the sake of serving Dalian Port, some dry ports have been developed around it as well.

In order to balance the economic and infrastructural disparity between the western of China and other regions, establishment of dry ports in the west obtains growing attention recently. For example, for the purpose of better connection between western part and the coastal area in the east, a multifunctional dry port will be constructed in Shaanxi Province. Additionally, government has also attempted to develop a dry port in Chongqing City because of its advantageous location and relatively developed processing industry.

## *4.6 Conclusion*

This chapter mainly focuses on the dry port. The trend of developing intermodal transport, the regionalization of seaports and increasing vessel sizes all accelerate

the establishment of dry ports in order to optimize the whole supply chain. As an intermodal node, dry port functions as a nodal point for seamless linkages between different transport modes to improve the efficiency of logistics. From the environmental perspective, dry port reduces congestions and further lowers adverse effects on environment. The construction of dry port would bring about numerous and various benefits for different stakeholders in the supply chain, such as increase in terminal capacity and hinterland expansion for seaports, reduced congestions on road and optimal use of land for cities, and lower bad influences on environment for society. From different point of view, dry port could be classified into different categories. In terms of distance, dry ports are divided into distant/midrange/close dry port. As for the relationship between dry ports and seaports, they are grouped into feeder/hub dry port. Another group is continental and inland dry port. Concerning the development of dry ports in China, although several dry port clusters are developed, it is still in the primary and traditional stage. And the majority of dry ports are established on the basis of major seaports. For inland regions, especially the west part, shortage of dry port is a major problem for them. However, in order to improve logistics in the west part and to optimize connection between the west and other regions, the establishment of dry port is a feasible method. And China also makes investment in constructing dry ports in the western part.

# Chapter 5 Analysis on the Development of Gwadar Port Based on SWOT

Since 1993, the government of Pakistan had carried out technical and financial feasibility studies. Construction of Gwadar Port did not commence until the Port of Singapore Authority was hired for its operation and management. Meanwhile, according to the Gwadar Port Authority, the Gwadar Port was constructed on a turnkey basis by China. With heavy investment – technique and finance – from China in two construction phases of Gwadar port, it is now being built as a deep-sea port in the world.

## *5.1 Benefits of Gwadar Port*

5.1.1 From the Perspectives of Pakistan

By effectively making advantages of available coastline resources, constructing and developing Gwadar Port will stimulate economic growth in Pakistan, especially the western and northern parts. And then offering transshipment facilities and providing a convenient platform for transit trade also make the landlocked Central Asian Countries and Afghanistan have access to the international market. Just as Syed Fazl-e-Haider (2011) stated that Gwadar Port, apart from becoming an ongoing mega deep-sea port in Pakistan, also has enormous potentials for trade and economy.

Moreover, according to Gwadar News (2010), besides the strategic significance of Gwadar Port's location and developing transport system around it, there are other salient economic benefits of the development of Gwadar Port. First of all, development of Gwadar Port will generate a variety of evident investment opportunities (Appendix 1 shows). And Gwadar Port, as an emerging gateway to Central Asia and Western China, would provide services to the mainline vessels from Africa, Asia and Europe. This will improve transshipment volumes. Furthermore, the construction of highways and extension of railway lines will unlock and expand the hinterland coverage. Meanwhile, with the development of Gwadar Port, various industries and manufactures will be set up in this region, facilitating industrial development of Pakistan. Not only will it act as a catalyst for oil storage, refinery and petrochemicals projects, but also stimulate the formation of export and industrial zones as well as service industries, like hotels, accommodation and tourism. More specific benefits are listed in Appendix 2.

Gwadar Port will also alleviate the congestion that Karachi port is confronted with. It

will offer Pakistan crucial strategic depth (Ziad Haider, 2005).

### 5.1.2 From the Perspectives of China

In order to boost the economic growth in western China, instead of further expanding ports along the eastern coastline, Chinese government focused more attention on the Gwadar Port development.

Above all, the distance between western production centers and Shanghai Port or other eastern ports is approximately 3000 kilometers, while merely 1500 from western production centers to Gwadar Port (Pakistaniat Website, 2008). From this point of view, Gwadar Port is beneficial for the development of trade and economy in western China, because it seems to be more convenient for cargoes of western China to be transported to Gwadar Port rather than ports in the east. From figure 5.1 which displays the global shipping routes we can see that cargoes are traditionally either transported from Europe via the Malacca Strait to China or from Europe via Good Hope to China. Recently, the piracies of Somalia are very rampant, so vessels seldom travel on the latter route. The construction of Gwadar port provides China with an alternative shipping line. Cargoes could be delivered from Europe to Gwadar port, and then could be transported through the Karakorum Highway to Xinjiang province of China and further into inland regions. In comparison with the traditional shipping route, it mainly presents the following advantages:

- In terms of distance, it is obvious that the distance between Europe and Gwadar port is much shorter than that between Europe and Shanghai or any other eastern ports of China. The distance between the western part and Shanghai or other ports along the eastern coastline is roughly as two times long as that between western China and Gwadar port. Instead of shipping via the traditional maritime routes, it would be much closer to transport from Europe via Gwadar port to inland China. And shorter time would be taken. Thus, the Gwadar port would offer more convenient access to shippers and improve the efficiency of the whole supply chain.

- Moreover, given that regional protectionism in China leads to rather high interprovincial logistics expenditures, it spends less logistics costs on international trade for China. This means that delivering cargoes from Shanghai or other eastern ports to the west would take more money in comparison with transporting them from Gwadar to western China. In particular, China's immense contribution to Gwadar port with the extension of the Karakorum Highway and the construction of related transport network would further facilitate the connection between Gwadar port and western China. The optimization of

distribution network between the two regions would reduce logistics cost, making it more cost-effective to transport from Europe to inland China.

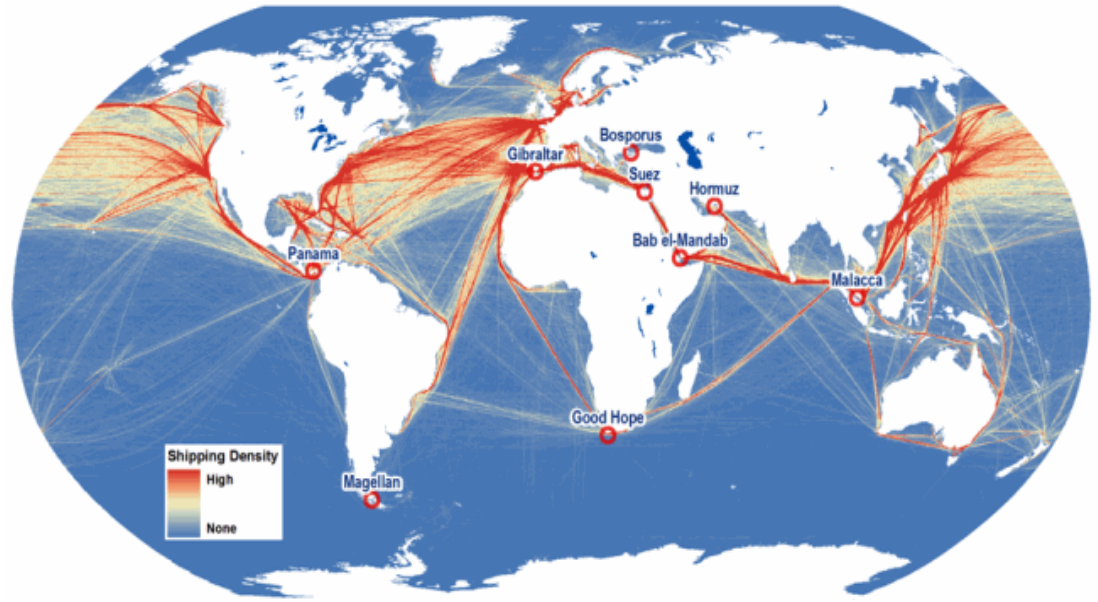


**Figure 5.1 Global Shipping Routes**

*Source: Maritime shipping routes and strategic line, [http://kochimarina.blogspot.com/](http://kochimarina.blogspot.com/)*

For better implementation of the China's Great Western Development Policy, China's involvement in the Gwadar Port project will provide an outlet for the landlocked Xinjiang region in China, especially with the construction of the Karakoram Highway. In this respect, it will make it more convenient for western China to have access to the Arabian Sea's waters (Ziad Haider, 2005). Thus, Gwadar port helps western China accelerate its openness to the outside world.

In addition, Middle East is the main source of crude oil for China, about 51% of crude oil being imported there. However, increasingly rampant piracy activities in the Straits of Malacca spurred China to search for an alternative route. Ziad Haider (2005) stated that China aimed at changing Gwadar Port into a transit and transshipment port for crude oil traded between Iran or Africa and Xinjiang Province of China, which also guarantees the security of energy-related cargoes along existing routes. Thus, Gwadar Port is of strategic significance for China, because to some extent it ensures the supply of strategic materials, especially crude oil.

Increasing size of vessels and trade volumes exert tremendous pressures on ports along the eastern coastline in China. Congestions at ports and cities compelled China to develop alternative ports, because limited space for expansion of ports in the east, like Shanghai Port and Shenzhen Port. Construction of Gwadar Port provides an alternative route for cargoes transported to China. These cargoes could

be carried by rail or truck to western region, and then to other regions in China. In a sense, construction of Gwadar Port also will alleviate congestions and pressures of existing ports in China.

Even though there are so many potential benefits for China to engage in developing Gwadar Port, it is also faced with various challenges and threats as well as opportunities. The following parts mainly analyze the development of Gwadar Port from the viewpoints of China based on SWOT method, evaluating the strengths, weaknesses, opportunities and threats for the development of Gwadar Port.

## *5.2 Strength Analysis of the Development of Gwadar Port*

### 5.2.1 Strategic Location

As a developing deep-sea port, Gwadar Port is the third port of Pakistan in addition to Karachi Port and Oasim Port. It is situated in a coastal town Gwadar in Balochistan Province of Pakistan. From Figure 5.1, it is obvious that Gwadar Port has immense geostrategic significance in many respects.


**Figure 5.2 Strategic location of Gwadar Port**

*(Source: Gwadar Port Megaproject, available from: http://www.skyscrapercity.com)*

In the first place, apart from being located at the apex of the Arabian Sea, Gwadar port is at the entrance of the Persian Gulf. And then, according to Gwadar Port Authority (GPA), it is approximately 533km from Karachi and 120 km from Pakistan's

border with Iran.

In addition to the aforementioned advantages, Gwadar Port is outside the Straits of Hormuz, through which about 40% of the global oil tankers pass as Zahid Anwar stated (2010). An author of Skyscraper city website (2006) demonstrated that Gwadar Port is strategically situated between three regions of the world which is progressively crucial: the oil-rich Middle East, South Asia with a large population and economically emerging Central Asia with rich resources especially oil and gas.

To sum up, as the Gwadar Port Authority (GPA) stated, Gwadar Port enjoys high commercial and strategic significance.

#### 5.2.2 Firm Relation between China and Pakistan

Since 1950, the bilateral relationship between People's Republic of China and Pakistan has established. And in 1962, the relation between China and Pakistan grew stronger and extremely close. From then on, regular high-level visits between the two countries took place. And various agreements have been reached. Simultaneously, China also has provided Pakistan with a lot of help in various domains, such as economy and technique.

President Hu Jintao of China utilized an appropriate idiom to describe the relationship between China and Pakistan, namely "higher than the mountains and deeper than oceans". Except that China focused attention on this relationship, Pakistan also treated favorable bilateral relationship with China as a pillar of its foreign policy. Apart from immense investment in Gwadar Port, China has been always making substantial investment in Pakistani infrastructure expansion. The cooperation between these two countries has reached high economic points. And two countries also have negotiations on free trade agreement.

As an advantage, the long-term and firm relationship between these two countries guarantees trust with each other, and also provides a stable cooperative environment for the development of Gwadar Port.

### *5.3 Weakness Analysis of the Development of Gwadar Port*

#### 5.3.1 Unfriendly Environment and Lagging Economic Environment

As news reported, on 3 May 2004, three Chinese engineers were killed by a remote-controlled car bomb on their way to the Gwadar Port. And other nine Chinese and two Pakistanis were injured in this accident. Unsecured environment seriously

influenced the construction of Gwadar Port.

Gwadar Port is located in Balochistan province of Pakistan. Local Baluchis oppose the construction of Gwadar Port, especially when they did not participate in the decision making process about the port. There are following reasons why they do not support the development of Gwadar port. They are worried that other provinces in this region will capture the economic gains of this project, so they treat this port as latent menace to their economic benefits and security. Furthermore, people from other regions will compete with local Baluchis to search for a job, so that local Baluchis would be confronted with unemployment situation. Besides, the influx of people of other provinces and regions will affect the integration and purity of their culture. And they are afraid of Pakistan Army's regular military presence in this area. Thus, some local people vented their frustration unburdened their resentment by taking some violent actions. They frequently destroyed gas pipelines, almost every day. Not only did this seriously damage local energy resources, but also cause enormous pecuniary loss. They even often demolished army bases and injured army personnel.

Apart from turbulence in local area and rejection of localities, Balochistan province is backward hinterland of Pakistan. Serious poverty, illiteracy and unemployment as well as other tricky issues all perplex Pakistan government. Under such lagging economic circumstance, it will be rather difficult for Gwadar port to healthily develop. To some extent, it could not be denied that this is an internal disadvantage for the port future development.

#### 5.3.2 Insufficient Infrastructure and Facilities of Gwadar Port

Infrastructure construction and equipped facilities of Gwadar port are underdeveloped, because this port is under construction and just newly developed in recent years, especially when the mega vessels which put more pressures on the future development of ports are built and put into operation. As an emerging deep-sea port, a variety of limitations of this up-rising star, such as limited number of terminals, insufficient berth depth and unproductive equipment and facilities. All of these problems inevitably impose adverse impacts on its development.

### *5.4 Opportunity Analysis of the Development of Gwadar Port*

#### 5.4.1 China's Development Policy

Since the reform and opening up, eastern cities developed rapidly, especially coastal cities like Shanghai and Shenzhen. Increasingly obvious unbalance of economic

development between the eastern part and the western part comes into exist. Meanwhile, industrial structure in burgeoning metropolises has begun changing. The tertiary industry is becoming more and more dominant instead of the second and the primary industry. Thus, labor cost in the east is more expensive than that in other regions. Increasing labor cost gives rise to the movement of processing manufacturers into inland areas, such as cities in the west of China. Particularly, after the Chinese Government proposed the Great Western Development Policy, low labor cost and untapped potentials attract more and more investors to operate factories and to make investment in the west.

However, apart from wretched natural conditions, taking the disadvantageous location – far away from sea ports – into consideration as well as poorly developed transport infrastructure, it is better for Chinese government to develop a port closer to the western part and to improve transport system there in order to guarantee the implementation of the Great Western Development Policy and the stable development of the west.

Thus, economic gap existing in China and the proposal of relevant policies which target at developing western China offer beneficial background and various opportunities for the development of Gwadar Port.

### 5.4.2 Pakistan's Attention

Except China's current development situation aforementioned, Pakistan's intention, policy and active cooperation also provide numerous opportunities for Gwadar Port development.

As early as year 1964, Gwadar had been identified as a port site. Pakistan's government also carried out technical and financial feasibility studies on construction and development of Gwadar Port in early years. Pervez Musharraf, the 10$^{th}$ president of Pakistan, regarded Gwadar Port as prosperity for Pakistan. With the operation of Gwadar Port, Pakistan will become an important commercial platform for Gulf with plentiful energy resources, Central Asian States with large population and burgeoning China. In addition, Gwadar Port is of strategic significance for Pakistan Navy. Therefore, development of Gwadar Port is imperative for Pakistan.

### 5.4.3 Increasing Trade between China and Pakistan

Long-term firm relation between China and Pakistan has also given rise to stable bilateral trade between two countries. Especially, in recent years, trade volume between China and Pakistan has grown stably. Sudha Ramachandran (2005) stated

that in 2004, bilateral trade between two countries rose by 35% to $2.4 billion, half the trade volume between China and India. He also demonstrated that China contributed more to the trade volume, with total $1.8 billion exports in comparison with Pakistan's $575 million.

China and Pakistan have recognized that the development of Gwadar Port will bring about substantial economic returns for both countries. However, from another point of view, steadily increasing trade volumes will also stimulate the development of the Gwadar Port.

### 5.4.4 Progressively Developed Transport System

During the process of Gwadar Port construction, other major infrastructure projects were also built in order to support the development of Gwadar Port, such as road, rail, air and pipeline connections. Not only does the completion of these projects help expand hinterland coverage of Gwadar Port, but also provide numerous convenience and opportunities for China to trade with other regions.

*Highway*

The Government of Pakistan has always been undertaking various projects of highway constructions which connect Gwadar Port with the entire hinterland of Pakistan. The 700 kilometers Makran Coastal Highway which links Gwadar with Karachi, Jiwani and Gabd has been completed. The express Highway from Gwadar to Ratodero via Turabt, Khuzdar and Shahdadkot, Gwadar – Quetta bypass and Gwadar town – Gwadar by pass were also accomplished.

In addition to the completed project – the Makran Coastal Highway, a network of roads, which connect Gwadar with Karachi, Pasni, Ormara and Turbat, will be built in four phases, Zahid Anwar (2010) said. He further stated that the 675 km Coastal Highway which links Karachi with Gwadar is being constructed simultaneously with the port. In Phase II of the project, highways from Pasni to Gwadar (135 km), Ormara – Gwadar (275 km) and Gwadar to Turbat (188 km) will be built. Other two highways that connect Pasni with Ormara and Gupt at the Iranian border will be carried out in Phase III and Phase IV respectively.

Moreover, in order to connect Gwadar with the backbone of the Pakistan National Motorway System, the M8 Motorway will be constructed. Gwadar Port will be directly linked to Multan, Lahore, Isamabad/Rawalpindi and Peshawar.

And the Karakoram Highway help Gwadar Port connection extend into Afghanistan

to the west and north into China and Commonwealth of Independent States (CIS). This network of highways will facilitate the Gwadar Port acting as a key transportation hub which provides enormous trade to Pakistan also Central Asian and China.

*Railway System*

For the purpose of connecting Gwadar with the upper adjacent country, the government put forward a plan to build a new rail line (Gwadar – Panjgor – Dalbadin – Quetta / Chaman) which links the cities of Peshawar and Quetta together. And then new rail lines down all the way to Gwadar will be set. According the article on Skyscraper City Website (2006), by the open-up of these rail lines, Gwadar will be connected with the whole nation. What is the most important is that Gwadar will be linked to the Karakoram Highway, along which the most northern station lies. Eventually, in the future, a rail link between Karachi and Gwadar will be constructed.

*Air links*

Gwadar's airport is located in the north of the city borders. Originally, there were merely regular flights between Gwadar and Muscat, Karachi and Quetta. Expansion of this airport has been undertaken in order to satisfy increasing demand. In addition, in order to establish more links in the future, a new international airport is being built in the Northwest of the industrial regions which are situated in the east of Gwadar.

*Pipeline*

Pakistan, Turkmenistan, Afghanistan and India signed over $7 billion gas pipeline project on 11 December 2010 to construct the Trans-Afghanistan Pipeline (TAP or TAPI) and the Iran – Pakistan – India Gas Pipeline (IPI).

The Trans-Afghanistan Pipeline (TAP or TAPI) is about 1680 km long. Being a proposed natural gas pipeline, TAPI will transport Caspian Sea natural gas from Turkmenistan through Afghanistan to Pakistan and then to India. According to Zahid Anwar (2010), TAPI will start from Dauletabad gas field (Turkmenistan), alongside the highway running from Heart to Kandahar, via Quetta and Multan in Pakistan, and eventually end in the northwestern Indian town of Fazilka.

The Iran – Pakistan – India Gas Pipeline (IPI) is another important gas pipeline, also known as the Peace Pipeline. It will be implemented to deliver natural gas from Iran to Pakistan as well as India. The 560 mile pipeline will be built from the huge offshore South Pars gas field in the Gulf through Pakistan. It is obvious that this pipeline is significantly crucial for the increasing energy requirements of Pakistan.

## *5.5 Threat Analysis of the Development of Gwadar Port*

### 5.5.1 Inimical Environment

Even though Gwadar port will generate immense economic benefits for China and Pakistan, it is indeed incurring dissatisfaction and suspicion of regional players, such as India and Iran. Ziad Haider (2005) stated that India and Iran suggest that Gwadar Port would exert threats and pressures on their economic interests and security.

India has conscientiously focused attention on Gwadar port construction. It suspected that China attempts to encircle India by investing substantially in Gwadar port and then operating the port. India has closely observed activities and actions of China along the Makran coast, where Gwadar port is situated, Indian Navy Chief Admiral Madhavendra Singh stated. He also announced concern that Chinese Navy embarked building close relation with some peripheral nations that could impose threats on India's critical shipping lines in the Gulf. India is planning to take corresponding measures for the purpose of securing energy routes and competing with China because of its presence in the Arabian Sea.

Not only will suspicion from neighboring countries lead to an inimical environment for development of Gwadar port, but also incur unstable surroundings around this port. From a long-run point of view, this may bring about more troubles and tough issues in the future.

### 5.5.2 Potential Competitors

Iran, as another watchful and wary neighbor, is just 72 kilometers away from Gwadar. From Iran's perspectives, Gwadar port will undoubtedly exert threats and pressures on the development of Iranian ports, because Gwadar port will grasp related business and reduce throughput. In order to capture access shipping routes and energy-related trade from Afghanistan, Kazakhstan, Kyrgyzstan, and Tajikistan, Iran government has started building Ghabahar port which is located in Iranian Balochistan province of Seestan to tacitly compete with Gwadar Port (Ziad Haider, 2005). Meanwhile, India is in favor of construction of Ghabahar Port. And a 213 km road connection between Afghanistan and this port has been constructing by India. This Iranian port provides India with an easy access to Central Asian markets.

Pakistani officials have already realized Iran and India's intention and ambition. They stated that the Ghabahar Port would seriously affect financial and economic situation of Pakistan. Obviously, such strategic competition surrounding Gwadar port will exert economic threats on Gwadar port development by taking business away.

### 5.5.3 Increasing Size of Vessels

Size of the main vessel types on international shipping trunks changed from 3000 TEU in the early 1990s to 6600 TEU later. Until now, vessel size has increased to 9000 TEU, 14000 TEU and even 18000 TEU in the near future with the proposal of Triple E. Increasing vessel size had long been a trend in shipping industry. In order to cater for increasing shipping volumes and ever growing objective requirements, upsizing of vessels appeared. Even though increasing vessel size is able to improve economic benefits by close to 20% because of economies of scale, it also generates some adverse influences. For example, progressive increase in vessel size proposes more demanding requirements for natural conditions, accessibility and equipments and facilities of ports. This undoubtedly will influence productivity, efficiency and operation of ports. Meanwhile, hub – and – spoke network is becoming more and more dominant in the globe. Thus, increasing investment in port expansion and equipments because of larger vessels may outweigh the decreasing transport cost due to economies of scale. Table 5.1 displays ship categories and corresponding length, draught and berth depth.

In terms of Gwadar Port, as a newly developing international port, some limitations and deficiencies still exist, such as insufficient terminals and limited numbers of port facilities. Continuous increase in vessel size will incur such an embarrassment that a finite number of vessels can berth at Gwadar Port. In other words, if mega vessels call at Gwadar Port, this will cause inefficiency and low productivity at port and even congestion.

**Table 5.1 Vessel size and corresponding related data**

| Containership Type | Vessel Length（m） | Size（TEUs） | Draught（m） | Berth Length（m） | Berth Depth（m） |
|---|---|---|---|---|---|
| **First Generation** | 170 | 700-1000 | 8 | 200 | 10 |
| **Second Generation** | 225 | 1000-2500 | 10-11 | 250 | 12 |
| **Third Generation** | 275 | 2500-3000 | 11.5-12 | 300 | 14.5 |
| **Forth Generation** | 294 | 3000-4000 | >=12.5 | 300 | >=14.5 |
| **Fifth Generation** | 347 | 4000-8000 | 12.5-14.5 | 350 | >=14.5 |
| **Mega containership** | 396 | 8000-15000 | >=14 | 400 | >=15 |
| **Super Containership** | —— | —— | <=18.9 | —— | —— |

### *5.6 Conclusion*

From 5.2 to 5.5, the author respectively analyzes the strengths, weaknesses, opportunities and threats of development of Gwadar port from the perspectives of China in details. Table 5.2 summarizes the internal and external factors that affect this port's future development.

**Table 5.2 Internal and External Factors (SWOT of Gwadar port development)**

| | | |
|---|---|---|
| Internal Factors | Strengths | Weakness |
| | Strategic location with geopolitical and economic importance | Strong objection of local Balunchis and backward development of hinterland |
| | Long-standing and firm bilateral relationship between China and Pakistan | Inadequacy of infrastructure construction and facilities of Gwadar port |
| External Factors | Opportunities | Threats |
| | China's current unbalanced economic development situation and related western development policies | Inimical environment because of two key players – India and Iran – in this region |
| | Pakistan's attention and effort on the port construction | Potential competitors – Iranian Ghabahar port |
| | Steadily increasing trade between China and Pakistan | Increasing size of vessels |
| | Progressively developed transport system around the port for hinterland expansion | |
| Source: Author | | |

In order to healthily develop Gwadar port and to fully make advantages of economic benefits generated by this port, apart from sufficiently utilizing its location geographic advantages, governments of China and Pakistan should consolidate bilateral relationship between two countries and should focus more attention on bilateral trade. Moreover, Pakistan government should convince local Baluchis as well as stabilize local environment to provide safe internal development environment. Meanwhile, being confronted with external challenges and competitions, Gwadar port should improve handling productivity and service level to attract more customers. In terms of infrastructures, with completion of related transportation infrastructure, especially road and rail connections, Gwadar port will be connected with more regions, so that hinterland coverage will be expanded. What is the most important is that western

China will have an access to participate in the international market. Favorable infrastructure construction will provide a variety of opportunities for the port's development. Thus, both governments should seize the opportunities

## Chapter 6 The Role of Xinjiang in Gwadar Port Development

Since 1067, China and Pakistan have reached border trade agreement. And in the following year, they started to construct Karakorum Highway, also known as KKH, which took two countries twenty years to complete. The Karakorum Highway has been cut through the Himalayas and the Karakoram mountains, and along the way it has been stretched over the gorges, hills, valleys and rivers as well. According to OurPakistan Website[1] (2001), Pakistan is connected with the city Kashgar of the extensive Xinjiang Province of the People's Republic of China by the Karakorum Highway which also passes through Khunjrab pass at 16200 feet over sea level. Thus, the Karakorum Highway, as a passage through the landlocked and isolated regions with numerous high mountains, is critical for the distribution network and logistics connection between Pakistan and China, especially western China.

The Karakorum Highway a.k.a. the "Sino-Pakistani Friendship Highway", as the major road connecting Western China with Northern Pakistan, starts from Kashgar city of Xinjiang province, via China and Pakistan border – Khunjerab Pass and ends at Thakot city of Pakistan. It was inaugurated and passed by truck by 1969. Kashgar is connected with other cities in Xinjiang Province of China by Southern Xinjiang railway which was opened in 1999. Then people and cargoes can be transported from Kashgar via Karakorum Highway to Rawalpindi which is located in the Pakistan's main road and rail networks.

The Karakorum Highway serves as a backbone to connect Gwadar Port in Pakistan with inland China, especially Xinjiang province. From this we can see that Xinjiang plays an indispensible role in future development of Gwadar Port. Xinjiang, as part of Gwadar port hinterland, its logistics system and distribution network are of important significance for hinterland expansion of Gwadar port, namely further into other inland regions of China. Next, the author will introduce basic information of Xinjiang, and then analyze situation of logistics development there.

### *6.1 Introduction of Xinjiang*

#### 6.1.1 Strategic Location

China's Xinjiang Province is located in the middle of the hinterland of the Eurasian Continent, being contiguous with Russia, Islamic Republic of Pakistan, Kazakhstan, Kyrgyzstan, Tajikistan, India, Mongolia and Afghanistan 8 countries. It is the strategic road that links Central Asia, West Asia, South Asia and Europe. Lao and Wu (2008)

[1] Karakorum Highway, 2001, http://rpakistan.tripod.com/kkh/kkh.htm

proposed Xinjiang's Economic Circle which is the core region consisting of Xinjiang and its peripheral countries with interrelation, interdependence, complementary strengths and common-pool resources. Depending on Eurasia Continental Bridge as west-east channel, the economic region radiates Southeast Asia in the east, west towards Europe, Pakistan and India in the south, and Russia and Mongolia in the north. 13 core economies that consist of Xinjiang's Economic Circle are: Xinjiang, Russia, Mongolia, Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan, Tajikistan, Afghanistan, Pakistan, Iran, India and Chinese inland regions.

Moreover, Xinjiang is situated in the "Golden Belt" of New Eurasia Continental Bridge which towards the east links approximately 360 square kilometers radiation area of China. Besides, the Second Eurasian Continental Bridge covers Japan, South Korea, Southeast Asia and Hong Kong/Macao/Taiwan as well. Westwards, it crosses Kazakhstan etc. central Asian regions, passes some European states and reaches Rotterdam and Belgium etc. main ports along the Atlantic Ocean. Along the bridge, it covers above 30 nations and regions with total length of 10800 kilometers. Thereby, as the western bridgehead of the Eurasian Continental Bridge, Xinjiang is the main gateway for China's openness to the world, especially western countries. New Eurasia Continental Bridge starts from Lianyungang of China, and reaches Rotterdam, linking economic hinterland of China with Central Asia with plentiful energy and mineral resources as well as developed European market. Compared to Eurasia Continental Bridge, the New Eurasia Continental Bridge is more competitive in terms of total mileage and freight rate. Passing Alashankou to Central Asian and European regions, the haul distance is roughly 2000 kilometers shorter than that of the bridge passing Siberia. And the speed is much higher than shipping. It is obvious that New Eurasia Continental Bridge is the hub of economic hinterland of China and Central Asia and even Europe.

As an intermediary and entrepot, Xinjiang can increase the added-value of inland area and compensate the vacancy of Central Asian shortage of products with high technology. Utilizing the favorable geographic location, Xinjiang cooperates with states of Central Asia, South Asia and West Asia in building up platforms for a wide array of economic and commercial activities. In general, Central, West and South Asian countries have plentiful natural resources, ample energy reserves and enormous economic potentials. However, foundation for economic industry is relatively weak. Such situation provides economic cooperation in the logistical region with extensive space and opportunities.

### 6.1.2 Plentiful Natural Resources

Estimated reserves of coal, crude oil and natural gas of Xinjiang Province

respectively accounts for 40%, 30% and 34% of that of the whole country. Reserve volumes of other minerals like zinc, iron, copper and lead come top as well. Xinjiang is expected to be an important energy and mineral resource base because of large quantity of reserves. Furthermore, plenty of various agriculture products provide high potential for its logistics development.

### 6.1.3 State of Trade

*Status of international trade development*

Among the countries of Xinjiang's Economic Circle, Kazakhstan is the biggest border trade partner of Xinjiang. Trade volume from Xinjiang to Kazakhstan accounts for more than 80% of bilateral trade volume, and makes up above 85% of Xinjiang's border trade volume. According to Yuan (2006), since 1992, Kazakhstan has consecutively been the largest trading partner of Xinjiang for 11 years. And it is followed by Pakistan, Kyrgyzstan, Uzbekistan and Tajikistan. Total trade volume of aforementioned five countries accounts for 84.6% of Xinjiang's trade of import and export. In terms of product classification, Xinjiang's export commodities to these countries mainly focus on light industrial products, especially durable commodities and consumable goods, for example, food, textiles, household appliances and apparels. Meanwhile, Xinjiang imports steel, iron mine, precious metals, crude oil and other raw materials for industry.

*Status of domestic trade development*

In a way of total domestic trade volume, Xinjiang's domestic trade develops steadily. And with the proposal of West Development Policy, it increases impressively and has huge potentials as well. From the perspective of product category, circulation of commodities between Xinjiang and inland presents characteristics of complementary advantages. Main products that Xinjiang sells to inland include cotton, sugar, cotton yarns, cotton fabric, tomato ketchup, juice, dry fruits, rice and other agriculture and energy products. Inland commodities transported to Xinjiang are mainly general merchandise, household appliances, machinery, materials and machines and other consumer goods with relatively high technology.

### 6.1.4 Industrial Layout of Xinjiang and Its Peripheral Nations

Xinjiang's traditional pillar industries are cotton, crude oil and coal. Cotton output of Xinjiang is around 35% of the global yield. There are about 27 counties/cities with over ten thousand tons output of cotton. Cotton industry has become the important pillar industry of Xinjiang's agriculture. According to China's "Eleventh-Five Plan",

Xinjiang's petrochemical sites concentrate on Dushanzi, Kalamayi, Urumchi, South of Xinjiang and Tuha. Coal mining in Xinjiang is primarily distributed in Urumchi and other 17 important mining areas. In the meantime, Xinjiang will adjust and optimize the industrial structure of Wuchang economic zone. It will be developed into the largest manufacturing hub focusing on high technology industry, petrochemical, iron and steel, electric machine, textile, light industry, food, pharmaceuticals and building materials.

As for peripheral regions around Xinjiang, their pillar industries are as Table 6.1 displays.

**Table 6.1 Pillar industries of peripheral regions around Xinjiang Province**

| Country | Pillar industries |
|---|---|
| **Russia** | Energy, raw materials, transportation |
| **Pakistan** | Agriculture, textile industry |
| **Mongolia** | Mineral exploitation, agriculture and animal husbandry |
| **Kyrgyzstan** | Planting, animal husbandry, exploitation and process of gold and other nonferrous metals |
| **Uzbekistan** | Cotton planting, gold |
| **Tajikistan** | Nonferrous metallurgy industry (aluminum), food industry, textile industry |
| **Turkmenistan** | Crude oil and natural gas |
| **Iran** | Crude oil and gas industry |
| **India** | Software industry, textile industry |
| **Inland area of China** | Manufacturing, service industry, high technology industry, agriculture, basic industry and resources processing industry |

*Source: Lao and Wu (2008)*

From this table, we can see that five Central Asian Nations, Pakistan and Iran mainly depend on energy industry, mineral exploitation and agriculture, therein, resources industry is particularly developed. Concerning about Russia, its pillar industries are energy and raw material production. As for Mongolia, it focuses on agricultural and

animal husbandry. Software industry and textile industry are pillar industries of India, and its textile industry not only competes but also complements with counterpart of Xinjiang. China's inland region lives by manufacturing, service industry and new technology industry.

## *6.2 Logistics Development in Xinjiang Province*

### 6.2.1 Transportation Infrastructure

Xinjiang's transport network consists of roads, railways, airports and inland ports as nodes, linking inland of China as well as radiating Central Asia, South Asia and European continent.

Road: as backbone and artery of Xinjiang's road system, three vertical and three horizontal national highways connect provincial-level trunks, provincial-level highways and county-level roads as well as passenger and freight transportation hubs. Such convenient road network with high efficiency links the eastern coastal region of China with Urumqi, passing Kashgar, Afghanistan, Kyrgyzstan, Uzbekistan, Tajikistan, Pakistan and India, even extending to Gulf Coast. Moreover, in terms of road construction with peripheral countries, Xinjiang invested 400 million Yuan in constructing 5 highways of ports with 444 kilometers mileage. With the completion of related projects, the majority of ports highways will be above the third-level standard, tremendously improving the transport situation and capacity of various ports. And since 1991, China has signed a wide array of road transportation agreements. Complying with these protocols, China has cooperated with five Central Asian countries in road transportation in succession, continuously propelling the process of road transport facilitation between China and Central Asian nations.

Railway: Lanzhou – Xinjiang Railway functions as artery of Xinjiang. Southwards, it extends to Kashgar. Additionally, it reaches to Alshankou, being close to Huoerguosi. Hami in the east is also covered by this network.

Pipeline: with the longest length of pipeline among all provinces in China, Xinjiang possesses gas and oil pipelines. The pipeline of the "Transport Western Gas to East" Project transports 12 billion cube meters gas annually. And 200 million tons of oil will be transported through Sino-Kazakhstan oil pipeline. In addition, total length of oil and gas pipelines under construction is more than 6700 kilometers.

Civil aviation: Xinjiang has 12 airports and develops 96 international and domestic lines, forming full-range radiating aviation network.

Ports: in Xinjiang Province, there are 17 first level ports, such as Alashankou and Huoerguosi, and 12 second level ports. As an important railway port, Alashakou connects Western China with the Far East and various nations in Europe. Moreover, with handling machineries of large scale, it possesses strong stevedoring capacity and warehousing capacity. For the last more than ten years, it has successfully organized transit transport of above one hundred thousand twenty equivalent units (TEUs). Meanwhile, it is also known as “main artery of transnational energy transport” in China. Apart from Alashankou, Huoerguosi is another important port with recently developed infrastructures. New logistic center for cold storage and fresh-keeping is being developed. In comparison with first level ports, shortage of advanced infrastructure and warehouse of second level ports is a critical issue to be addressed. It is obvious that Xinjiang has distinct advantages and broad prospects for trade and commercial cooperation with Central Asia, West Asia and Russia.

### 6.2.2 Profile of Industry and Logistics Zones in Xinjiang

In Xinjiang, there are 32 industry zones of which four are national development zones. These four development zones mainly concentrate on economic belt of Xinjiang, especially Urumqi and Shihezi city. Besides, 24 development zones at provincial level distribute in major cities in Northern Xinjiang Economic Belt and in Southern Xinjiang with plentiful oil storage. These cities are Urumqi, Shihezi, Changji, Kuitun, Kuerle city and Kuche town. In addition to Baketu, Alashankou and Huoerguosi three major ports, 4 border economic zones are constructed in Tacheng, Bole and Yining city as well. Being in primary phase, supporting facilities and infrastructure related to logistics services of these industry zones are still of inadequacy. Meanwhile, aforementioned industry zones are required to be improved.

As for logistics zones, presently, logistics parks and logistics centers are main transaction and trade hubs for a wide array of economic and commercial activities among various industries. For example, Guanghui Logistics Park and Hualing Commercial and Trade Center charge rent and service fee by providing operation place and certain services. Some specific logistics centers possess their own truck fleet or offer consultancy service for transportation. Some also provide distribution for commodities, especially for goods within short distance. However, merely limited logistics services are provided.

### 6.2.3 Existing Problems and Constraints

*Main existing problems*

In terms of present problems that hinter Xinjiang’s logistics healthy development,

relatively low socialization and specialization separate each logistics section from each other, conduce to fragmented distribution system, and even lead to increase in operational costs. In comparison with international developed countries, especially with developed logistics industry, such as USA, Holland and Japan, it is necessary and urgent for Xinjiang province to lower logistics cost in order to strengthen competitiveness in the world.

Additionally, instead of TPL enterprises in large scale, local logistics companies in Xinjiang are scattered, small and unprofessional. These small corporations are incompetent to undertake domestic and international logistics service. Meanwhile, low level information and technology also make it tricky to integrate logistics.

Currently, commodities of Xinjiang are mainly industrial raw materials and agriculture products with bulky and awkward characteristics which are suitable for rail transport. However, as for trains from Xinjiang to inland area, serious shortage of empty train carriages leads to difficulty in meeting market demand. Besides, Xinjiang is short of warehousing facilities. Even those existing warehouses are relatively obsolete, and most of them are distributed around industrial cities and rail junctions. Integration of the existing warehouses is a primary mission for modern logistics development.

Even though Chinese government has made enormous investment in constructing transportation networks, there still exist various problems for railway and road system in Xinjiang. For railway, small scale of network and low density cannot satisfy vast demand for regional economic development. In addition, low efficiency at ports is another issue needs to be addressed; otherwise, this will impose pressure on ports development in Xinjiang. Moreover, unstable political and economic environment of peripheral countries around Xinjiang also limits Xinjiang’s logistics development.

*Major existing constraints*

There are four major elements that make constraints on logistics development of Xinjiang Province, namely conception, infrastructure, management and talents.

Above all, governments at all levels do not have systematic logistics conception, and they think that transport department should be responsible for logistics development. Their conception of logistics still limits to physical distribution. Shortage of the notion of outsourcing logistics results in reduced profits and low competitiveness as a consequence.

Then management system is another factor. In domestic market, there is no specialized department to administer logistics industry. Railway, road, aviation, transportation and trade departments take responsibility for corresponding logistics

services. Fragmented administration system separates logistics sections and whole logistics process, which is unbeneficial for integration and optimization of available resources.

Current infrastructure construction in Xinjiang lacks connections. Whole effectiveness of logistics infrastructure still needs to be exploited. Additionally, ports in Xinjiang all locate in border regions with wicked natural conditions. Unfavorable location increases difficulty to build logistical infrastructure of inland ports.

Low level of education consequently results in inadequate talents. Development of Xinjiang's logistics urgently requires professional talents for logistics operation and management. And in particular, shortage of senior specialized managers who deal with foreign transportation and integrated logistics planning is also acute.

### *6.3 The Role of Xinjiang in Gwadar Port Development*

With strategic geographic location, Xinjiang is linked with several countries. Moreover, the Second Eurasia Continental Bridge also favorably connects Xinjiang with Central Asia, Southeast Asia and even Europe. Convenient transportation undoubtedly stimulates and facilitates a variety of economic and commercial activities between Xinjiang and other countries. Simultaneously, this facilitates hinterland expansion for Gwadar Port.

As for logistics development, railway, road and inland ports in Xinjiang have made a significant progress. Xinjiang has been better connected with peripheral regions, especially other inland regions of China. There is no doubt that as an important node that links inland China and Gwadar Port, improving transport infrastructures in Xinjiang not only stimulates Gwadar port development, also boosts economic development of western China. However, logistics industry still has a wide array of tough issues to address. Better logistics parks, namely dry ports need to be established, which will further facilitate connection between Western China and Gwadar Port.

On the basis of above analysis of Xinjiang's important geographic location, economic and trade development, industrial layout and logistics status in particular, it can be seen that as the origin of the Karakorum Highway in China, Xinjiang plays an indispensible role in connecting inland China with Gwadar Port of Pakistan. This means that Xinjiang facilitates transportation and logistics of inland China as well as expanding Gwadar port hinterland coverage and its further development.

### *6.4 Conclusion*

The Xinjiang Province, as a major gateway for inland China, plays a progressively important part in optimizing national distribution network and improving logistics of China. Among all the cities in the west part, Xinjiang possesses several superiorities, advantageous geographic location, relatively developed economy and relatively favorable transport infrastructure. The Second Eurasian Continental Bridge connects Xinjiang with a number of countries, even the countries in Europe. Most importantly, it is connected with Pakistan by the Karakorum Highway which facilitates the connection between inland China and the Gwadar Port. And the Gwadar Port provides the inland China with an alternative shipping route instead of the ports along the eastern coastline in China. The Gwadar port is beneficial for logistical improvement of Xinjiang Province, and further stimulates logistics system of inland China. On the other hand, Xinjiang also benefits the development of Gwadar port. They are mutually beneficial to each other. Moreover, they are both critical for inland logistics network of China.

## Chapter 7 Summary and Conclusion

The Reform and Opening-up Policy proposed by Chinese government activated economic development of Eastern China, especially with the proposal of Development Strategy of China's Coastal Ports which accelerated the openness of the Pearl River Delta and the Yangtze River Delta. Rapid economic development of eastern part to significantly drives overall level of national economy. Predetermined goal has been reached. However, when we take the whole country into consideration, it is easy to realize that obvious and serious economic disparity exists between different regions, especially inequality between eastern and western part. Such unbalanced development will adversely affect the sustainability of long-term economic development of China.

In terms of the elements that impose constraints on western development, wicked natural environment and landlocked geographic location – far away from ocean – are natural factors. Apart from natural constraints, some economic and artificial elements also adversely affect western development, such as unreasonable economic structure and insufficient and frail infrastructures, conception of local people, low educational level and shortage of talents. Among these factors mentioned above, poorly developed infrastructure, especially transport system, leads to inefficient and lagging logistics industry, and further places a curb on economy in the west as a "bottleneck". Undeveloped logistics system and distribution network restrict development speed of Western China.

In order to facilitate the implementation of the Strategic Development of Western China Policy and to improve economic level of western China, Chinese government focuses on improving logistics system and optimizing distribution network, especially in the west part. Particularly, in recent years, road and railway system has seen impressive development and improvement, even though still not sufficient. Meanwhile, apart from making enormous investment in domestic transport system, China immensely invested in the construction and development of Gwadar Port in Pakistan as well, because it will bring about a variety of benefits to China, namely:

- Gwadar Port is beneficial for the development of trade and economy in western China, because it seems to be more convenient for cargoes of western China to be transported to Gwadar Port rather than ports in the east due to longer distance between the west and east part.
- Moreover, for better implementation of the China's Great Western Development Policy, China's involvement in the Gwadar Port project will provide an outlet for the landlocked Xinjiang region in China, especially with the construction of the

Karakoram Highway. Thus, Gwadar port helps western China accelerate its openness to the outside world.

- Gwadar Port will play as a transit port for oil from Iran and Africa to Xinjiang of China. Thus, it is strategically important for China since it guarantees the supply and security of strategic materials to China, especially energy-related commodities, such as crude oil.
- Construction of Gwadar Port provides an alternative route for cargoes transported to China. These cargoes could be carried by rail or truck to western region, and then to other regions in China. In a sense, construction of Gwadar Port also will alleviate congestions and pressures of existing ports in China.

Even though there are so many potential benefits for China to engage in developing Gwadar Port, it is also faced with various challenges and threats as well as opportunities. By adopting SWOT analysis method, the development of Gwadar port is confronted with following strengths, weakness, opportunities and threats from the perspectives of China (as the following table displays):

| | Strengths | Weakness |
|---|---|---|
| Internal Factors | Strategic location with geopolitical and economic importance | Strong objection of local Balunchis and backward development of hinterland |
| | Long-standing and firm bilateral relationship between China and Pakistan | Inadequacy of infrastructure construction and facilities of Gwadar port |
| | **Opportunities** | **Threats** |
| External Factors | China's current unbalanced economic development situation and related western development policies | Inimical environment because of two key players – India and Iran – in this region |
| | Pakistan's attention and effort on the port construction | Potential competitors – Iranian Ghabahar port |
| | Steadily increasing trade between China and Pakistan | Increasing size of vessels |
| | Progressively developed transport system around the port for hinterland expansion | |

*Source: Author*

Xinjiang, possessing strategic geographic location, is adjacent to several countries. Additionally, the Second Eurasia Continental Bridge facilitates the connection between Xinjiang and other regions, such as Central Asia, Southeast Asia and even Europe. Favorable location and convenient transportation stimulate economic and commercial activities in Xinjiang as well as expanding hinterland coverage of Gwadar Port. Meanwhile, road, railway and inland ports in Xinjiang have seen significant progress, which play an indispensable role in helping connect Xinjiang with peripheral regions. Therein, the Karakorum Highway serves as a backbone that connects Xinjiang with Pakistan, namely inland China with Gwadar Port. As origin of the Karakorum Highway in China, Xinjiang functions as an important node linking inland China and Gwadar Port. On the one hand, more extensive hinterland of Gwadar port will stimulate the development of this port. From this perspective, Xinjiang plays an important role in Gwadar Port development. On the other hand, Gwadar Port provides an alternative route for inland China to undertake import and export trade, and this route is more convenient than the route between west and east part of China. At the mean time, construction and development of Gwadar Port optimizes distribution system of China, especially Xinjiang province, and further boosts economic growth of Western China. Thus, the benefits are mutual for Xinjiang and Gwadar Port.

However, even though transport infrastructures in Xinjiang such as road, railway and inland ports have been improved a lot, numerous and various tough issues still appear in the logistics industry and distribution network there, and require to be addressed. In order to fully make advantage of Gwadar Port and to improve logistics system, it is necessary to establish better logistics parks, namely dry ports in Xinjiang. Researches states that dry ports will generate following potential benefits:

| Potential advantages generated by dry ports | |
|---|---|
| Seaports | Reduced congestions at seaports and its vicinity<br>Increase in terminal and storage capacity<br>Hinterland expansion |
| Seaport Cities | Less congestion on road corridors<br>Sufficient utilization of land |
| Rail Operators | Deployment of economies of scale<br>Obtain more market share |
| Road Operators | Reduced time loss in queuing at terminals and congested road |
| Shippers | More convenient access to seaport<br>Green marketing |
| Society | Lower adverse influences on environment<br>Higher employment and more job opportunities |
| *Source: Roso (2009)* | |

Not only will the construction of dry ports in Xinjiang enhance the implementation of intermodal transportation which will improve the efficiency of transport, but also strengthen the connection between suppliers in inland region with seaports. Thus, better and more favorable connection between Gwadar port and inland China by adopting dry ports in Xinjiang will further optimize overall distribution network and drive economic development of China, especially Western China.

## Bibliography


1. Fengjun Jin et al, 2010, C*hina's regional transport dominance: Density, proximity, and accessibility*, Institute of Geographic Sciences and Natural Resources Research, CAS, Beijing, China;
2. China Highlights, 2011, *China transportation*, Available from: <http://www.chinahighlits.com>;
3. Liaoning Student online alliance, 2010, *Port economic development and competition in China*, Available from:< http://www.stuln.com>;
4. Thomas A. Foster, August 2007, *As China Develops its interior, supply chain must change as well*, Available from: <http://www.supplychainbrain.com>;
5. Zhifang Lv, September 2010, *Pondering and suggestions for sustainable development of domestic dry ports*, No.3, Research on waterborne transportation, Jiangsu Transportation Research Institute, Waterborne Transport Engineering Design Institute, Nanjing, China;
6. Gwadar Port Authority, *Gwadar Links: Gwadar Port*, Available from: <http://www.gwadarport.gov.pk/Home.aspx>;
7. Skyscraper City, 2006, *The Gwadar Port Megaproject*, Available from: <http://www.skyscrapercity.com/showthread.php?t=392948>;
8. Zahid Anwar, 2010, *Gwadar deep sea port's emergence as regional trade and transportation hub: prospects and problems*, Journal of Political Studies, Vol.1, Issue 2;
9. Gwadar News – Gwadar news and business source, 2010, *Gwadar Port,* Available from: <http://www.gwadarnews.com/gwadar-port.asp>;
10. Syed Fazl-e-Haider, 2011, *Gwadar: An emerging gateway port to Central Asian & West China*, Available from: <http://www.syedfazlehaider.com/books/>;
11. Author D. Little, April 2006, *Gwadar Master Plan – Implications for energy sector development*;
12. Pakistaniat, June 2008, *Gwadar Port: a great development project or a great game?*, Available from: <http://pakistaniat.com/>;
13. Ziad Haider, 2005, *Baluchis, Bejing, and Pakistan's Gwadar Port, Politics and diplomacy*;
14. John W. Garver, 2006, *Development of China's overland transportation links with Central*, Southwest and South Asia, The China Quarterly;
15. Yanping Gong, Bencheng Luo and Junhua Zhou, June 2010, *Discussions on Western Inland Dry Ports Construction and Operation Mode*, Research on waterborne transportation, No.2, the Ministry of communication , China;
16. Xinhua Net, 2009, *Economic Development in western China*, Available from: <http://news.xinhuanet.com/politics/2009-09/17/content_12067406.htm>;
17. Chinese Government's Official Web Portal, 2010, *Western China Economy*

*catching up with eastern China: official*, Available from: <http://www.gov.cn/english/2010-12/14/content_1764932.htm>;
18. Jiaqi Yang, 2009, *Towards the restructuring and coordination mechanisms for the architecture of Chinese transport logistics*;
19. He Guohua, 2008, *Forest of regional logistics requirements and application of grey prediction mode*, Journal of Beijing Transport University (Social Science Edition) (in Chinese);
20. Liu Nan, Li Yan, 2007, *Interaction between logistics development and economic growth in China*, Journal of Industrial Engineering and Engineering Management (in Chinese);
21. Li Aibin, Zhao Pianpian and Zhao Yuanli, 2009, *Empirical Analysis on the Relationship Between Logistics Industry and Economic Growth in Xuzhou*;
22. John Kerr, 2004, *China confronts logistics challenges*, Logistics Management, Available from:<www.logisticsmgmt.com>;
23. John Kerr, 2007, *Special Report: A Roadmap to China's Logistics Landscape, Logistics Management*, Available from:<www.logisticsmgmt.com>;
24. Mark Goh and Charlene Ling, 2003, *Logistics development in China, International journal of physical distribution & logistics management*, Vol. 33, No. 10;
25. Bin Jiang and Edmund Prater, 2002, *Distribution and logistics development in China: the revolution has begun*, International journal of physical distribution & logistics management, Vol. 32, No. 9;
26. Hercules Haralambides, Girish Gujar and Hongyan, 2010, *Role of dry ports in emerging economies: a comparative perspective*;
27. Violeta Roso, 2007, *Evaluation of the dry port concept from an environmental perspective: A note*, Science Direct, Transportation research part D 12, pp. 523 – 527;
28. Andrius Jarzemskis and Aidas Vasilis Vasiliauskas, 2007, *Research on dry port concept as intermodal node*, Transport, Vol. XXII, No. 3, pp. 207 – 213;
29. Theo Notteboom and Jean-Paul Rodrigue, 2009, *Inland terminals within North American and European supply chains*, Transport and communications Bulletin for Asia and the Pacific, No. 78, Development of dry ports, United Nations ESCAP;
30. Paul Garnwa, Anthony Bresford and Stephen Pettit, 2009, *Dry ports: a comparative study of the United Kingdom and Nigeria*, Transport and communications Bulletin for Asia and the Pacific, No. 78, Development of dry ports, United Nations ESCAP;
31. Andrea Rosa and Riccardo Roscelli, 2009, *Innovative ideas and design of an integrated dry port and seaport system*, Transport and communications Bulletin for Asia and the Pacific, No. 78, Development of dry ports, United Nations ESCAP;
32. Claudia Caballini and Enrico Gattorna, 2009, *The expansion of the port of Genoa:*

*the Rivalta Scrivia dry port*, Transport and communications Bulletin for Asia and the Pacific, No. 78, Development of dry ports, United Nations ESCAP;
33. Violeta Roso and Kent Lumsden, 2009, *The dry port concept: moving seaport activities inland?*, Transport and communications Bulletin for Asia and the Pacific, No. 78, Development of dry ports, United Nations ESCAP;
34. Adolf K. Y. Ng and Girish Gujar, *The spatial characteristics of dry ports in India*, Transport and communications Bulletin for Asia and the Pacific, No. 78, Development of dry ports, United Nations ESCAP;
35. Erene Cronje, Marianne Matthee and Waldo Krugell, 2009, *Trade and transport costs: the role of dry ports in South Africa*, Transport and communications Bulletin for Asia and the Pacific, No. 78, Development of dry ports, United Nations ESCAP;
36. Violeta Roso and Kent Lumsden, 2010, *A review of dry ports*, Maritime economics and logistics, Vol. 12, No.2, pp. 196 – 213;
37. Violeta Roso, Johan Woxenius and Kenth Lumsden, 2009, *The dry port concept: connecting container seaports with hinterland*, Journal of transport geography, Vol. 17, pp. 338 – 345;
38. Xinjiang Government, 2009, *Report of Investment Promotion on Xinjiang Logistics Industry*, China Academic Journal Electronic Publishing House, Available from: http://www.cnki.net;
39. Siyang Lao and Zuodong Wu, 2008, *Location of logistics centers in Xinjiang from the perspective of Xinjiang Economic Circle,* Journal of Finance and Economics of Xinjiang, Vol. 5;
40. Bin Jiang and Edmund Prater, 2002, *Distribution & Logistics development in China: the revolution has begun*, International Journal of Physical Distribution and Logistics Management;
41. Xiaoling Li, 2005, 27 ports opening to the outside world, Newspapers of materials information, No.2.

## Appendices

### *Appendix 1 Investment opportunities*

| Investment Opportunities | |
|---|---|
| **1** | Master Plan related infrastructure i.e. internal road & service, water and power and communication services for the new ownership and the Industrial Zone. |
| **2** | Private owned warehouses and cold storages. |
| **3** | Private cargo handling equipment and trucking yards. |
| **4** | Corporate infrastructure i.e. offices for operating firms & agencies. |
| **5** | Development of Industrial Zone and Industries. |
| **6** | Labor related amenities for thousands of workers employed on development work Great Gwadar. |
| **7** | Hospitals, Colleges & Schools. |
| **8** | Tourism related industry. |
| **9** | Marine related industry i.e. shipyards, dry dock and repair yards. |
| **10** | Marine Fuel bunkering for visiting ships to include large fuel storages and mobile barges etc. |
| **11** | Oil refinery and large oil storages. |
| **12** | Ferry services between Gwadar – Karachi/Oman/Bunder Abbas and UAE. |
| **13** | Industrial Export Processing Zone. |
| **14** | Hinterland road: Gwadar – Rattodero Expressway (735km) will pass through Turbat – Awaran – Khuzdar & Shahdad Kot. |
| **15** | Gwadar – Quetta (via Turbat – Panjgoor – Kharan – Nushki) requires to be widened and improved. This link road will reduce the distance to Quetta from 1090 km to 795 km. |
| **16** | Railway: Gwadar – Panjgoor – Dalbadin (515 km). |
| **17** | Gwadar – Afghanistan via Quetta by National Highway – N-25. |

| | |
|---|---|
| **18** | Hotels and Motels |
| *Source: Gwadar News – Gwadar news and business source, 2010, Gwadar Port* | |

## *Appendix 2 Benefits of the development of Gwadar Port*

| **Benefits of Gwadar Port** | |
|---|---|
| **1** | Capitalize on opportunities for trade with landlocked Central Asian States and Afghanistan |
| **2** | Promote trade and transport with Gulf States |
| **3** | Trans-shipment essentially of containerized cargo |
| **4** | Unlock the development potential of hinterland |
| **5** | Diversion of influx human resources from up country to Gwadar instead of Karachi |
| **6** | Socio-economic uplift of the province of Balochistan |
| **7** | Establishment of shipping related industries |
| **8** | Oil storage, refinery and petrochemicals |
| **9** | Export Processing and Industrial Zones |
| **10** | Reduce congestion & dependency on existing Ports Complex at Karachi/PQA |
| **11** | Serve as an alternate port to handle Pakistani trade in case of blockade of existing ports |
| **12** | Will become a Regional Hub for major trade and commercial activities |
| *Source: Gwadar News – Gwadar news and business source, 2010, Gwadar Port* | |