

Industrialization and Environmental Issues in China

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Serious environmental obstructions have occurred due to the weak basis and arbitrary industrial structures in contemporary China. The layout of industrial structure has direct impacts on the outcome of the industrialization, and the benefits for the local people could be crucial factors during the process of industrial development. It discusses the major causes for the environmental disasters, investigates and analyzes the factors that generate environmental problems based on field study materials. It proposes the workable solutions to balance the development between industrial construction and environmental protection.

INTRODUCTION

The industrialization is defined as the process during which people produce and mobilize natural resources through mass ways. Industrialized production created immeasurable material wealth in the last 200 years for human beings, but at the same time, it polluted and damaged the natural environment because of its extensive way of mass production. At present, China's aggregated economy ranked the 2nd and yet China is still the largest developing country in the world with considerable environmental issues caused by industrialization. In future time, the beneficial strategy for China's industrialization should be trying to achieve at a balanced status to accelerate industrial development while simultaneously protecting the environment. From the year of 1978, China had been promoting modern industry process and creating economic miracle within a brief time, which were even achieved by some developed countries in over 100 years. During this process, what measured most was the relationship between industrialization and environmental protection. A huge systematic project was planned to meet harmonious development despite its extreme difficulties (Zhang, Long, Lv et al. 2016).

The Industry and Economies in China

The initial task of industrialization was to improve the productivity of a country or a region. It aimed to promote productive mode to transfer from handcraft production under the traditional farming civilization to large scale mechanized production under modern industrial civilization and to reach at powerful and prosperous target. China's industrialization changed the traditional manner of production

and established foundation for great renaissance. It was from the 18th century that China began to develop industrial production and industrialization (Wang and Tian, 2014). This event was an essential and important economic activity to change people's fate in China. China's industry was dilapidated and incomplete without any specific managing systems before 1949, during which period China was extremely poor and underdeveloped. What's more, there was almost no heavy industry existed at that time. The industry, traffic, communication etc. were under very bad condition in most part of the country. Automobiles, trains, chemical equipment, raw material, medical machines, medicines, and even the tinplate for cans etc. were imported from other countries (Tsin 2013).

After 1949, when the People's Republic of China was established, industrial development was listed on the top for national construction. The reform and opening-up in China accelerated industrialization again and pushed it to another important stage. Taking China's steel and automobile production as examples, in 1949, China's steel production was 158,000 tons, less than one million tons of the same production in the world range. As one of the newest industries in the world, the products, science and technology, funds and management of automobile manufacturing industry had been the symbol of national industrialization in China. Till to 2010, the crude steel production of China had reached 626.7 million tons, with year-on-year growth as 9.3%, accounting for 44.3% of the global aggregate. Till to 1959, the automobile production of China achieved 16,000 sets. Till to 2010, the automobile production and sales volume in China reached 18.2647 million sets and 18.0619 sets respectively, with year-on-year growth as 32.4% and 32.37% respectively (China Auto Industry Accusation 2011). China created the new high of global history in this region and from then on ranked the 1st in the world.

According to the authoritative report of comprehensive assessment of China's industrialization issued by Chinese Academy of Social Science, and based on a general standard of division, industrialization process could be divided into three stages, respectively initial, medium and postindustrial stage, with each stage including the first half and the latter half. Data showed that in 1995, the comprehensive index of China's industrialization was 18, which proved China was at initial industrialization stage at that time. In 2000, the index climbed to 26, showing that China had entered the latter half stage of initial industrialization stage. In 2005, the index reached 50 and made China be at the stage of middle industrialization. It could be predicted from the growth rate of comprehensive index of China's industrialization that till to 2021, the index would arrive at 100 (Chen, Zhong and Wang 2007). It revealed that China's industrialization process had passed a half journey. Establishing an industrialization country would not be only a far dream.

As the world factory, China's economic development was comparatively backward in 1949 especially in the western part of minority areas, where there was almost no industry. According to authoritative statistics, there was 36 million of minority population in 1949, among which almost 1 million were living under slave economic standards, with about 0.8 million living in primitive condition. For some minority people in mountainous areas, they were living in slash-and-burn cultivation mode with manpower and horses as the main means of transportation, and narrow footpaths as the main roads. Under such circumstances, the government of People's Republic of China united all forces to promote economic development. Within recent 50 years, China's industrial construction in western minority areas had reached new high with most of the infrastructures been improved greatly, especially after the project of "Western plan" being carried out with the power of reform and opening (Yin 2016).

In the first decade of 21st century, over 130 key projects were launched by the country for the development in western areas, with a total investment of 2,200 billion RMB. These projects include Qinghai-Tibet Railway Project, West-East Electricity Transmission Project, Large Airport, Expressway, Hydropower Stations Project, etc. During The 2nd 10-Year of Western Development (2011-2020), 18 key projects were commenced in China, including Chengdu-Lanzhou Railway Project, Chongqing-Guiyang Railway Project, Sichuan Daduhe Luding Hydropower Station Project, Yunnan Lancang River Gongguo Bridge Hydropower Station Project, etc., with a total investment of 468.9 RMB (Statistics of National Development and Reform Commission 2012). In Chinese history, this much amount of investment was the largest scale for pushing forward the condition of western industry constructions. Recently, the oil and natural gas industry in Xinjiang Uygur Autonomous Region developed very fast, which ranked the 3rd

and 2nd in China respectively. It had become the national important energy production base and strategic replacement areas. Furthermore, Guangxi Zhuang Autonomous Region and Guizhou and Ningxia Hui Autonomous Region had also become the important production bases of the national Aluminum Oxide and Electrolytic Aluminum (Bayramov, Buchroithner, McGurty 2012).

The Win-win Model

Industries were primitively developed in China to pursue an outcome for the double-win targets of accelerating economic development while simultaneously protecting natural environment. On one hand, this model limited energy consumption in a very strict way; on the other hand, it tried hard to forbid comprehensive project to avoid severe environmental pollution. Many efforts were done to assure the implementation of this model, including strengthening policy forces, improving the quality of environmental projects etc.

Regarding policy forced, the National Development and Reform Commission (NDRC) and some other departments performed their own responsibilities accordingly. While accelerating the construction of industrial projects, they strictly checked and reviewed and put on records of the projects with high energy consumption and severe pollution to protect the environment, and expanded the supervision inspection force of the implementation of outdated policies.

From 2006 to 2007, the State Auditing Administration sampled 41 enterprises randomly from 1000 cases chosen in China to investigate the energy consumption and environmental pollution status. 16 power enterprises, 13 petrification enterprises, 12 steel and nonferrous metals enterprises were included in the research. These enterprises had established special mechanisms, which were responsible for energy-saving and emission reduction duties, and implemented several powerful measures for energy-saving and emission reduction. For example, 41 enterprises eliminated 589 sets (suits) of outdated technological equipment and saved about 675,800 tons of standard coal annually. 16 power enterprises shut down 22 sets of small thermal power units, which installed gross capacity reached 1.57 million KW. These measures promoted the update and optimization of economic structures powerfully. Compared with 2005, in 2010 the ratio of the thermal power units above 300 MW to the thermal power installed capacity all over the power industries of the country increased to 71% from 47%. In steel industry, the ratio of large blast furnace with over 1000 m³ capacity increased from 21% to 52%, and the ratio of new cement clinker production of construction materials industry increased from 39% to 81%. These measures, which promoted technology progress and strengthened policy incentives, had received obvious benefits. From 2005 to 2010, the unit GDP energy consumption of the whole country reduced 19.1%, and the Sulfur dioxide emissions of the whole country reduced 14.29%, the chemical oxygen demand emissions of the whole country reduced 12.45%. The target task confirmed in “The 11th Five Year Plan” Outline were realized basically. In the matter of improving the quality of environmental projects, some large projects, which were confirmed as keeping ecological balance by local governments, were ivory-towered. In fact they were constructed blindly. These projects were suspended and caused the waste of resources.

Shaanxi Province established “Help Wei from Han” Project Coordination Leading Group Office and constructed large abstraction works to relieve the water shortage problem in the central Shaanxi plain. It was planned to take water resource from the main stream of Han River in the south of Shaanxi Province, and make the river water reach the north of Qinling Mountains via mountains through artificial streams from the south of Qinling Mountains, and then make the water run into Wei River in the north, and finally connect it with the water supply system in the central Shaanxi plain. However, the so called the biggest water conservancy project in the history of Shaanxi Province had passed the review of Western Environmental Protection Supervision Center of Ministry of China Environment Protection. On January 7, 2013, Shaanxi Environmental Protection Office published a notice (Shaanxi Environmental Protection Office 2013). The Ministry of China Environment Protection issued the written decision of administrative penalty about the “Shaanxi Help Wei” from Han Project Violates Environment Assessment System.

This decision of administrative penalty appointed that through investigation and verification, the Environment Impact Document submitted for Shaanxi Help Wei from Han for approval had not been

approved, and this project was commenced in August 2009 arbitrarily. It violated the provisions of Environment Assessment System stated in Article XXV of Environmental Impact Assessment Law of the People's Republic of China. It was provided in Clause II, Article 31 of Environmental Impact Assessment Law of the People's Republic of China that in case the Environmental Impact Assessment Document submitted for constructing projects was not approved or without the approval through re-checking by the original approving department, and if the construction unit commences arbitrarily, it shall be suspended by the environmental protection administrative department in charge who has the authority to approve such environmental impact assessment document of the project, and 50 thousand to 200,000 RMB might be fined. Besides, the responsible leader or other responsible people of the construction unit shall be disciplinarily sanctioned.

According to the provisions above, the Ministry of China's Environmental Protection decided to suspend Shaanxi Help Wei from Han Project and donated 200,000 yuan for it. China has implemented industrial construction projects on consideration of the benefits of several parties, and industrialization develops fast. China has become the 2nd economic entity; all national peoples are going forward to establishing a well-to-do society.

Contradiction and Difficulties

The development of China's industrial construction had gone through a very tough time. Lots of difficulties were encountered. Problems like how to balance the relationship between developing speed and economic benefits, and how to enable the public to obtain the maximum welfare during industrial construction were faced by the whole nation. The period after the establishment of New China witnessed the transformation of an agricultural country to an industrial country. During this period, however, the society was not developed in a balanced way.

In 1958, the Great Leap Forward activity was carried out all over the country. Great Steel Making took a very important leading position, and it is one of the symbols of the Great Leap Forward activity. On September 1st, 1958, an editor named Get moved immediately and completed the great task to double the steel production. It was published on the People's Daily, which started an unprecedented large scale of Great steel making nationally (Pan, Li and Hao 1993). Each province and cities implemented the development policy, which taking Steel as Strong, and realizing 10.70 million tons of steel production once became the first central task of the whole country. Therefore, industrial projects were constructed everywhere like a swarm of bees and large quantity of persons working for making steel. An editorial was published on October 12th, 1958 on the People's Daily, saying 6 million people were making steels in Henan Province. The Xinhua News Agency published on October 13th, 1958 that there was a steel-making team in Sichuan province with huge members of 8 million.

According to research data, all the provinces in China arranged 50 million labors to make steel. Some offices, teams, schools as well as citizens also helped to establish furnaces to make steel. According to the reports in Xinhua News on October 18th, 1958, 2400 blooming furnace were established in Xinhua county of Hunan province, 88% of which could make steel normally (Pan, Li and Hao 1993). According to Xinhua News on October 29th, 1958, 6.7 million of people made steel on that day. They produced 1.05 million tons of iron and 11,000 tons of steel daily. On the second day, they produced 1.33 million tons of iron and 13,000 tons of steel. Such similar reports once were seen on newspapers, broadcastings as well as other media easily, which enabled high-index, issue confused orders as well as tendency toward boasting and exaggeration to be very popular. As a result, more losses were caused.

Fuel was needed for steel production. Substantial number of people living in rural areas, therefore, cut trees to meet fuel needs. For example, in Maguan County, Wenshan Zhuang and Miao Autonomous Prefecture, forests were damaged severely in 1958. Over 20,000 mu of original forests on Laojun Mountain was damaged. 33 streams on the mountain became dry, and over thousand mu of farming land at the foot of the mountain was dried up. The oldest soldier during the Long March Period of the Red Army- Xu Teli once returned to his hometown in Hunan Province in 1956. At that time, he was 80 years old. At the end of 1958, when he returned to his hometown again, he found that the previous green hill turned to yellow mud, and all forests were damaged completely (Yan, Zhu, Zheng 2015). Therefore, when

the first in command of the local government reported the Leap Result to him, he asked “where are the trees on the mountain?” That responsible leader had to tell him the truth: “They are used for steel production”. Xu Teli shook his head and signed: “We should not damage our ancestors’ mountains or damage our sons’ future”. After he returned to Beijing, he donated 2,000 RMB for ecological restoration.

The same also occurred in Qujing City, Yunnan Province in 1958, and the area of the forests damaged was very large (Qujing Political Consultative Commission 1990). Yinchanggou, Pengzhou City, Chengdu of Sichuan Province was an area where there was full of dense forests, but in that year, to make steel, 30000 mu bamboo forests were cut completely (Li, Li, Yang et al 2016). Cutting trees to make steel brought very severe negative effects. Lingzai Village, Li’an Town Lingshui Li Autonomous County of Hainan Province is a village with thousand years of history and villagers love their ecological environment around them. Until now, elders in the village announced a public proclamation: anybody should not cut every tree and bush on the mountain! During the time when Japanese troops occupied Lingshui, they thought there were the communist parties hidden on the mountain, so they prepared to burn the mountain. But the villagers bared the way tightly. What was regretful was that, during the Great Steel Making period, many tall trees on the mountain were cut (Chen 2006). Later, with nearly a half century’s rest and reorganization, that mountain reproduces a wild profusion of vegetation scenery.

The previous Member of the Political Bureau of the Central Committee, member secretarial of the CPC Central Committee and the vice prime minister of the State Council- Yu Qiuli (1914-1999) pointed out that the central government decided in 1958 to call on making steel greatly, but it moved forces, acted blindly and caused too much waste (Yu 2011). Being regardless of objective conditions, it developed the heavy industries blindly, which took steel industry as the leading position caused severe loss all over the country. Thus, it could be called that “More haste, less speed” (Chen 2015).

Currently China’s natural resources were insufficient with extremely tender ecology and large-sized population. There were some deviations existed during the process of constructing modern industry in some areas of China, mainly on aspects of overdeveloped resource exploitation, neglected ecological environmental protection while processing etc. Taking Liuzhou, Guangxi Zhuang Autonomous Region as instance, the industrial aggregate of Liuzhou City occupied 1/3 of the same value of the whole province. Nevertheless, from 1980s to the 21st Century, people paid too much attention to the products and production value instead of updating technologies, saving energies, reduce raw materials consumption etc. As a result, large scale of waste was made, benefits were cut down, energy consumption was high, severe pollution was triggered, large quantity of smoke and dust was emitted, and gas was exhausted. What’s more, during 1985-1995, the acid rain rate of Liuzhou was up to 98.5%, the worst condition was that the PH of rainwater was lower than 4 and it was typical “Ten Rainfalls Nine Acid” (Liu, Wei and Liang 2011).

Liuzhou was listed as one of the four acid rain areas in China, which was called “the Capital of Acid Rain”. People considered this kind of economy as extensive economy, which brought considerable economic benefits and at the same time damaged the environment seriously. Although with continuous technical creation and technical renovation, up to now, the traditional and extensive form of economic structures of industries had not been innovated completely, the discharge of wastes, waste water and exhaust gas produced during industrial production was still serious. In 2010, the output of industrial solid waste all over the country was 2.41 billion tons, increased 18.1% compared with the previous year. The storage capacity of industrial solid wastes was 240 million tons, increased 14.5% compared with the previous year. The output of hazardous waste of the whole country was 20 million tons, increased 11.0% compared with the previous year. The total waste water discharge all over China was 61.73 billion tons, increased 4.7% compared with the previous year. In 2010, In Shaanxi Province, Chongqing, Xinjiang and Guizhou, the discharge of industrial solid wastes exceeded 0.5 million tons. The discharge of industrial solid wastes of these 4 provinces accounted 70.6% of the discharge of industrial of the whole country (Ministry of Environmental Protection of China 2011). Due to the large quantity of “Three Wastes”, production efficiency was severely reduced, growth of economic benefits was largely obstructed and environment was extremely polluted.

Social Transformation

Before liberation, China was a society of small-scale peasant economy, which lasted for several thousand years of history. Therefore, the industrial construction process of China was a process of transformation from agricultural society to industrial society. It was a very tough time due to the special labor construction in that time. One important symbol of China's transformation from agricultural society to industrial society was that large amount of surplus labors from villages were transferred to cities, and they became the peasant-workers of industrial enterprises. For example, according to the data published by the State Statistics Bureau in January 2012, the total output value of construction industry of the whole China in 2011 was up to 11770 billion RMB, which was absolutely the first pillar industry of China economy. The peasant-workers proportion of labors in the construction industry of China was very high, which accounted for 1/5 of the total peasant-workers of China and accounted for 3% of the China population. This group contributed to China's economy greatly, and they also endured the worst back pay and occupational accidents.

According to the survey conducted jointly by Peking University, the Hong Kong Polytechnic University, from 2007 to 2012, when Beijing Walking in the World Cultural Development Center jointly established by the above two universities practiced providing services on site, it is tracing studied 131 occupational accident cases happened on construction sites, including 73 complete and effective cases, including 4 occupational accident death cases, with 5 persons involved. According to investigation, the middle-aged maturity construction labors involved in occupational accidents accounted 2/3 of the total occupational accidents, most of the occupational accident victims were the most important labors and economic supports from rural families. 95.9% labors suffered from occupational accidents had not received occupational training formally, and loss of occupational training caused construction labors fail to operate and construct safely according to the regulations.

When 73 occupational accidents occurred, 90% labors failed to be compensated for industrial injury. According to statistics, only 1 case had successfully obtained full refunds through legal procedures for industrial injury. Among all kinds of occupational accidents suffered by labors, high-fall accounted for 58.90%, electric shock accounted 4.10%, object attack accounted for 13.7%, mechanical injury accounted 17.80% and traffic accidents on the way to and from work accounted 5.50% (Peking University and the Hong Kong Polytechnic University 2012). On December 27th, 2008, when a premise under construction in Changsha City of Hunan Province was constructed, the lifts taken by labors fell suddenly while it was operating for unacceptable installation, which caused 18 persons die for falling from high altitude (Zhu, Du, Liu et al 2012).

On September 13th, 2012, in Building 7-1, Block C, Donghujing Park, Huanle Avenue, Wuhan City, Hubei Province, a construction lift filling with painters fully fell from 100 meters high. 6 persons were thrown out with 2 of them being female. With a loud crash, the lift smashed into the ground and the steel frame was scattered completely. As a result, 19 people died of this accident with 4 couples being included. Most of the victims were peasant-workers from villages of Huangpi District of Wuhan. In extensive form of industrial production system, the body or mental health of peasant-workers was injured, and many of them were disabled or dead for working (Zhou and Liu 2007). The peasant-workers supported the fast accumulation of the wealth of construction industry and other industries with their labor, but their own safety as well as other rights and benefits were not guaranteed to considerable extent.

In terms of agricultural hazards, improper management, outdated acknowledgement, unscientific industrial producing methods etc. caused catastrophic accidents which polluted lands by heavy metal. For example, according to the statistics of Ministry of Land and Resources, at present over 10% of the farming land in China had been polluted by heavy metal. Research results from Nanjing Environmental Science Institute of the Ministry of Environmental Protection showed that nearly a half of the city farming land in south China was polluted, with compositions of cadmium, arsenic, mercury as well as other poisonous metals and petroleum types of organic pollutants, so the soil organic content of soil decreases, soil hardens, and it led the production and quality of agricultural products to be decreased (Sexton, Urban, Donohue et al 2013).

The contiguous farming land in suburban areas of Yangtze River Delta was polluted by many heavy metals, which caused 10% of the soil loss productivity, and became poisonous soil. The researchers of National Agricultural Technology Promotion Center of the Ministry of Agriculture considered that, because industrial activities cause pollution and pesticide as well as chemical fertilizer also pollutes soil, the grain production of China reduces 10 billion KG every year (Pan and Pan 2012). The data assessed by the Ministry of Environmental Protection was that the grains polluted by heavy metal every year was up to 12 million tons, which caused 20 billion RMB of direct economic loss (Editorial Department 2012). Managing industrial pollution had become a very urgent task and this problem should not be ignored.

Although, under the existing resource restriction and labor providing structure, extensive form of development mode also led the development of the national economy, renovating such mode and establishing new industrial production mode with high intensification would be the inexorable trend for implementing sustainable development (He and Chen 2012).

The Layout of China Industries

Industrial layout mentioned to the dynamic distribution of regional industries or the combined production. Scientific and reasonable industrial layout would effectively promote the fast growth of national economy. Or otherwise, extensive form of industrial layout would be a crucial factor of causing environmental pollution. Industry had always been an important force for promoting local economic development, which might change regional features. Some local governments, however, usually neglected the impact of industries to the environment while they were arranging industrial projects because they were driven by simple economic benefits. They might even offer all kinds of favorable conditions to those enterprises leading to mass pollution. In some medium-sized especially state-owned private-employed coal mines or iron ores enterprises in China, current benefits and local economic benefits were greatly valued. Resulting in the situation that mineral resources were exploited arbitrarily and hazardous consequences were caused.

Shanxi Province, for instance, functioned as the coal energy base of China, exploited coal mines selectively with tendency on easily exploited mines and rich resources. They sometimes exploited those which were exploited easily and give up those which were exploited difficultly, or sometimes they exploit mines with rich resources and gave up inadequate resources, or they sometimes exploited main vein and give up small veins, which caused the lost coal in some areas are more than those exploited. Once there were over 1,000 small coal mines in Shaanxi Province, but only very few mines' production was in accordance with the standard coal mining method provided by the country, therefore, the resource recovery rate of these mines was only 40%. Small coal mines had been improved and rectified for many times by Shaanxi Government, but they were resurgent with different extent after each improvement and rectification. Small mines sought quick success and instant benefits usually constructed with low level, and there were full of loopholes on management, production and operation environment was very bad, especially the safety measures existed in the so-called documents only.

For another instance, at 16:05, April 21st, 1991, an extra-large gas coal-dust explosion accident occurred in Sanjiaohe Coal Mine of Hongdong County Shanxi Province, which caused 147 people lost their lives, besides 2 people were seriously injured and 4 were slightly injured. At about 00:00, December 6th, 2007, a gas coal-dust explosion accident occurred in Hongdong County of Shanxi Province, totally 105 died. At about 2:00 in the morning, February 22nd, 2009, a gas explosion accident occurred in Tunlan Coal Mine of Gujiao City, Shanxi Province, which caused 78 lose their lives. At about 14:30 on March 28th, 2010, a permeable accident occurred in Wangjialing Coal Mine of Xiangning County of Shanxi Province, which caused 153 people been caught, 38 died. Mining violating laws and regulations were the primary cause for coal mine accidents. During the transfer process of China national agricultural society to industrial society, a large amount of township enterprises emerged in some locations. These enterprises brought huge wealth for local government; meanwhile, some enterprises also polluted the environment and damaged the ecology severely.

Local governments usually cared more about benefits while seeking developing projects and neglected quality of factories. As a result, a batch of small factories which polluted the environment a lot were settled down in the countryside and mountain areas. For example, since the middle age of 1980s, small papermaking mills, chemical mills, dyeing and finishing mills as well as feather making mills along Huai River Basin emerged in succession, and they developed arbitrarily. There was a small town in Fuyang District of Anhui Province, only with several years of development, 500 small feather making mills emerged. These kinds of small factories had simple processing and outdated technologies without measures for managing pollution, their industrial waste water would undoubtedly be the severe pollution sources of Huai River Basin. On both banks of Huai River, there were tens of thousands of this kinds of small factories, scattered all over like stars in the sky or men on a chessboard, and every day, nearly 7 million tons of waste water and sewage would be discharged into Huai River. According to the statistics, 40% of township enterprises were the biggest pollution resources, as a result the rural environment pollution extended to the whole country from a point to a surface and the environment pollution hazards were aggravated (Li and Wang 2010). Violating rules of nature, developing industries on the cost of polluting the environment would be undoubtedly a more terrible hazard than poverty.

Pollution transfer refers to the transfer of loss, burden, hazards etc. from a country, a region or an industry to a comparatively weak region. In recent years, China had been suffering from some domestic enterprises and international enterprises' pollution transfer. Domestically speaking, city dwellers concerned more about environmental protection at present compared to rural residents. They cared more and more about the safety of living environment. Under such circumstance, some polluting enterprises couldn't survive in cities, therefore, they "dressed up" and transferred pollution from cities to rural areas.

For example, an Aluminum Industry Co., Ltd. of Jiangsu Province, which produces 0.2 million tons of aluminum ingot every year, had done large quantity of work on the aspect of managing environment pollution in recent years, but this enterprise still brings severe loss to the farmers around it. The village, which was only separated by a wall with this company, suffered a great deal from it, and the agricultural production reduced severely, large quantity of livestock was crippled or dead. What's worse, more and more villagers generally felt uncomfortable, hands and feet felt stiff, suffered from back pain, adenopathy and respiratory diseases. For another example, a fluoride main workshop had not taken any environmental protection measures, and all pollutants were discharged directly.

Once the Promised Land with picturesque scenery, characterizing a fine spring day, residents living happily, now had become dark smoke billows, stink was hard to be borne, hundreds of residents closed their doors and windows, and they lived in an area like a nightmare in the day time. According to the reflection of the villagers of this village, about 40% villagers were suffering from osteoporosis to different degree, children failed to grow tall, livestock failed to be bred, crops died back, fish and shrimp in the lake disappeared, large area of forests were damaged, fruits tress had been acapus. This factor belonged to severe polluting enterprise of Jiangsu Province, so it was difficult to stay there, and then it was transferred to Jiangxi Province (Zhou 2007). Undoubtedly, it was a typical case of pollution transfer.

Internationally speaking, developed countries transfer pollution to developing countries, which is an un-avoided and un-palliative fact in international communities. Developed countries transfer pollution internationally with mainly two methods, respectively trade transfer and direct investment transfer. For trade transfer, some developed countries took trade methods to intentionally transfer the hazardous technologies, processes, equipment and products to developing countries. A big company of an industrialized country resold the technologies, processes and equipment eliminated by its country to developing countries and as a result these developing countries were under new burdens (Liu 2009). For example, a joint venture enterprise of Shengyang City, Liaoning Province brought in the processes, which had been eliminated by foreign countries for many years, i.e. it used liquid mercury to produce fluorescent lamps, which caused the mercury concentration contained in the air in the workshop exceeded tens of times than the standard, the body health of workers was severely damaged. Some study pointed out that, at a stage, over 70% equipment of the enterprise invested by foreign merchants in China brought in from overseas were at a low and medium level, which damaged China's industry deeply.

For direct investment transfer, the enterprises of some industrialized countries invested to the developing countries directly, they were undertaking resource development, resource processing as well as other business activities, and they arbitrarily developed limited natural resources with large amount. Although such activities brought necessary funds for the development of local economy, they also consumed large amount of local resources and damaged the environment (Liu 2008). For example, there were many joint-ventured timber mills in Dalian City of Liaonign Province China owned by Japan, they bought timbers from China, processed them to final products and then sold them to Japan. This business certainly invested funds for the development of China and brought opportunities, but it also damaged the forest resources of China. In fact, this was a converted pollution transfer behavior. Stopping international industrial pollution transfer would be an important preventing task.

The Pollution Generated by Industries in China

Fast industrial development brought huge economic benefits and at the same time triggered environment hazards. As a result, both industrial production and people's living standards were severely threatened. The defects of high industrial energy consumption and severe pollution, and the management deficiency and responsibility loss would be main causes of China's environmental pollution during the process of industrialization. The per capita resource occupancy volume in China was comparatively insufficient. Some industrial projects, however, executed high energy consumption and made severe environmental pollution during production, combined with outdated technical equipment and hysteric management manner.

First, the Traditional way of industrialization had many defects in China. China's industrial construction had reached many achievements, but in fact, there were still many traps in the old industrial management and developing paths, which made the economy and society as well as the environment bear more and more potential contradictions. Traditional industrialization was almost a quantity extensive form of developing. It was a way of high energy consumption and high pollution, which would certainly cause local pollution and worse ecological environment (Zeng and Sun 2011). According to the data published at the National Industrial Energy Saving and Comprehensive Utilization Meeting held by Industrial and Informatization Ministry in Nanjing on March 28th, 2011, the industrial energy consumption of China reached to about 2.4 billion tons of standard coal in 2010 from 1.595 billion tons of standard coal in 2005, which accounted for over 70% of the energy consumption all over the country, and far higher than that of developed countries, which accounted for 1/3.

China's energy consumption of unit GDP was 2.8 times of world average level, and the energy consumption of unit product of heavy chemical industry was 10% even 20% higher than that of world advanced level (Zheng and Liu 2011). At present, the total recovery rate of the mineral resources was only about 30%, which was 20% lower than that of the world leading level. Obviously, extensive economy growth was mainly based on the growth of production factors investment, instead of the technical progress. Thus, the potential contradiction between industrialization, modernization, ecologicalization as well as sustainable development would be worsened. Second, environmental protection projects were not implemented completely. One of the important national economic development programs was environmental resource protection. However, in actual industrial construction, the configuration and operation of the projects were not implemented with full efficiency.

Qingshui river, looking like a green ribbon, running through South Buyi and Miao Autonomous Prefectures of Guizhou Province, Duyun City and Fuquan City as well as 10 cities and counties, such as Kaili City, Majiang County and Huangping County of Southeast Guizhou Miao and Dong Autonomous Prefectures, with star-studded beautiful and mysterious minority stockade villages on both banks, was famous for timber trade. In recent years, the river water turned to red black because of industrial waste water pollution. White foams float on the river could be seen everywhere with odorous smell.

In 2006, the total annual waste water discharge quantity in Qingshui River Basin was 10.53 million tons, and the industrial waste water was mainly from Fuquan City, Duyun City and Kaili City at the upstream, and the pollutants were mainly total phosphorus and fluoride. For example, in the Fuquan City at the upstream of Chong'an River, a primary tributary of Qingshui River, the construction of production

of phosphorus chemical industries, mainly Guizhou Hongfu Industrial Development Co., Ltd., which environmental impact report and approval requirements were not implemented seriously at the initial stage, the anti-pollution precautions were designed unreasonably, and the operation and management was improper, which failed to reach the environmental protection standard and requirements.

The slag yard of Hongfu Corporation's Phosphate Fertilizer Plant failed to take impermeable measures strictly, the waste water inside of the plant leaked severely. These defects had existed for a long time, so that large quantity of waste water containing total phosphorus and fluoride polluted Chong'an River. Since the first half of 2007, Guizhou Environment Protection Bureau ordered and urged 43 enterprises in Qingshui River Basin to renovate their projects polluting water environment. With the development of the pollution abatement of phosphorus chemical enterprises at the upstream of Chong'an River and the shutdown of Kaili Paper Mill, the pollution abatement of Qingshui River began to take effect. However, to maintain the effect of pollution abatement for a long time also needs more funds, technologies and precision management.

Third, the technological equipment's are outdated. Steel industry was the symbol of modern industry, which was the pillar of national modernization. Steel industry was an industry with very high energy consumption, no matter consuming coal, power or oil, etc., it would generate greenhouse gases, mainly Carbon Dioxide, to pollute the environment. Therefore, steel industry reduced energy consumption, to protect the environment directly. In 2008, the crude steel production of China was 501 million tons, which accounted for 38.32% of the steel production of the entire world. In 2012, the crude steel production of China was 740 million tons, which accounted for 45% of the same products all over the world. The steel production of China was No. 1 all over the world, and China was absolutely a big steel China. However, the technologies, equipment as well as management in the steel industry of China fell behind the world advanced level totally, so that compared with the energy consumption of the world advanced level, the energy consumption of steel industry of China; there was about 11% difference.

The total level of China metallurgy technological equipment was lower, which was 1/3 of the world advanced level, and about 20% of them shall be eliminated. One of the most crucial factors was that, industrial countries all over the world usually use large blast furnace with high modernization to make steel, but in China, a batch of outdated small metallurgy equipment were still used for production. In 2008, there were still small blast furnaces with about 75 million t/a production capacity used in China, and small converters and electric furnaces with 2500 t/a were used for production (Wang 2009). The process energy consumption of such small capacity is higher than the same kinds of equipment with large capacity. Such small metallurgy equipment' energy consumption is higher than that of large equipment commonly. Compare the small blast furnace for making steel with the large blast furnace used by Shanghai Baogang, the followings would be indicated (Wang 2009).

1. While making steel, the once the air blower produces 1m³ air energy, it shall consume 0.085kgce/t of energy. The air consumption of small blast furnace was over 1300m³/ton, some may reach 1500m³/ton. The air consumption of the blast furnaces with 4000m³ capacity of Shanghai Baogang as well as other enterprises was about 9501m³/t. Because the air consumption of small blast furnace was about 350m³/t higher than that of large blast furnace, so the energy consumption was 25.28m³/t higher than that of large blast furnace.

2. The furnace top pressure of small blast furnace was usually below 100kPa, but the furnace top pressure of the large furnace of Baogang with 235kPa with 135kPa difference. If the furnace top pressure increases 10kPa, the puddling ratio will reduce 0.3-0.5%, which was equal to about 1.15kgce/t energy consumption. The furnace topped pressure of the blast furnace with difference below 135kPa would cause the energy consumption to increase 15.578kgce/t.

3. While making steel, the content of pig iron and Si should not be too much and it should be controlled, to improve the quality of products with high pig iron content. The content of Si produced by small blast furnace was controlled around 0.8% usually, while that of large blast furnace was about 0.4%, with about 0.4% difference. The content of Si of pig iron decreases 0.1% would cause the focal ratio of the blast furnace to decrease 4kg/t, which was equal to 4 kgce/t energy consumption. The content of CO₂ of small blast furnace gas was about 18%, while that of large blast furnace gas is about 22%, and that of

Baogang blast furnace might reach 24.7%. If the content of CO₂ increases 0.5%, the process energy consumption would reduce 8.5kgce/t. The CO₂ of small blast furnace was 4% lower than that of large blast furnace, which energy consumption was 24kgce/t higher.

4. The cooling equipment of small blast furnace and the heat dissipation of furnace body accounted for 6.96% of total output heat of the blast furnace. The unit volume and surface area of small blast furnace were much larger than similar values of large blast furnace, and their heat loss was also higher than that of the large blast furnace. Therefore, the steel-making energy consumption of small blast furnace was 80-90kPa higher than the energy consumption of large blast furnace.

In recent years, another batch of small blast furnaces had been eliminated in China. Certainly, such elimination was limited by technical progress and technical renovation, etc. To eliminate them completely and establish large blast furnaces, the technological level and funds investment, etc. shall also be improved totally. In many industries, such as electronic industry and textile industry, etc., the above conditions also existed like that of steel industry.

Administration Deficiency and Lack of Responsibilities

Environment pollution in industrial construction was related to the entire population. However, some administrative departments and authority principals in industrial and mining enterprises failed to realize it deeply. Thus, the related management system and responsibility had the situation of deficiency.

The first is the unscientific testing indicator system of cadre working performance. Currently, there was a type of phenomenon in the economic construction, regarding the output value increasing speed of “material production field” as the major national object to be realized at all costs. Thus, the major standard to test the “working achievements” of administrative officers at all levels was the increasing indicator of GDP (Wu 2008), which drive government officials at all levels to abuse their power to allocate all kinds of resources to realize their “working achievements” by hook or by crook. In fact, this system and means were the old thinking mode and old way with the quantity expansion as the major objective and break away from the people’s living reality. Some local administrative officials only claimed the environment protection, but there were not any practical environmental protecting indicators in the cadre working achievements testing system. Thus, a strange phenomenon could be seen that the environmental protecting work was “important orally, minor while busy with working achievements and negligent in stressing practical economic indicator”. This strange phenomenon might cause the universal existence of illegal conditions at a region or a department. Moreover, “image project” provided “hotbed” and soil for “environment illegal actions”.

The Second is the unclear administrative authority and excessive segmentation. Ecological cycle and environmental change balance was a systemic objective phenomenon. For example, the ecological evolution of rivers and lakes were unified in the process. However, the watersheds management on water resources was segmented. The upper stream and downstream of rivers belonged to different provinces, autonomous regions, prefectures or counties. In terms of environment management, though national unified environmental protection laws and regulations were formulated, the execution conditions were different, which limited to the environment protection. This segmentation was unscientific in administrative aspect. In terms of sewage governance of rivers and lakes, the major contents and features of administrative segmentation was the financial segmentation.

It caused the unclear division of environmental matters power between the local and central government and produces repeated or deficient investment in environment protection. For example, sometimes the ministry authorities of center government initiated the treatment of cross-province watersheds environment while the environmental financial support couldn’t sustain the plan. Many local interests, however, were involved in the matters. As a result, many local authorities took the chance to “make profits” which led to excessive financial burden and failed effective payment for the central authorities. Sometimes, making local finance couldn’t sustain the water environment treatment for the local scope. It was apparently that unreasonable administrative segmentation needed to be changed with necessity and urgency.

The Third is the imperfect environmental laws and “rent-seeking” activities. For a long time, economic development speed had been a major indicator to test Chinese local government and the demotion and promotion of officials depend on it. Thus, some local governments were only eager to change the status of economic backwardness. Some cadres only gave priority to economic development and neglected environmental protection. They even interfered in the supervision and control of environment-protecting competent authorities and asked for turning a blind eye to the illegal pollution discharge. It was even quite universal in some regions to witness this slack law enforcement or interference, which produced “Rent-Seeking-phenomena”. Gordon Tullock, a professor of American George Mason University, thought that some speculators managed to engage in some nonproductive profit-making activities through all kinds of mediating means in the market economic competition, for wining income. This was the so-called “Rent Seeking”. It caused huge losses to the economic situation, largely exceeded the “Net Loss” Triangle (Gordon Tullock 2011) in the traditional monopoly theory. Undoubtedly, Rent Seeking was illegal and must be condemned.

There were many “Rent Seeking” phenomena in environment protection with substantial harm. For example, industrial construction project must be evaluated in the aspect of environment protection under the one-ticket veto system. Some public officials utilized this “privilege” for extortion. They gave the green lights to the parities which gave favor free and became strict for the ones who refuse to give. Some severe polluting enterprises offered bribes to the law enforcement officials to avoid punishments, which seduced the law enforcement officials to provide slight or no punishment on the illegal activities. Zhou Shengxian, the current Minster of Ministry of Environmental Protection, once pointed out that the situation of combating corruption and upholding integrity in Chinese environment protection area was very rigorous. In 2009, the national environmental-protecting system registered 73 cases and punished 76 party members and cadres, 30 of which were delivered to the judicial authorities for punishment. According to the incomplete statistics, there were over 600 people who were investigated for illegal actions in the national environment protection system from 2002 to December 2010 (Deng 2011). Cases of environmental protection corruption were featured by increasing quantity, growing severe cases, updated committing means, “renovated” means and strong disguised tricks.

The Fourth is the lack of social responsibility sense in industrial enterprises. The smooth development of environment protection required the active cooperation of industrial enterprises. But some enterprises turned a blind eye to their environment-polluting actions and they lacked basic social responsibilities. Some enterprises thought that much prohibitive cost had to be paid for law-abiding actions. Thus, enterprise would not like to treat pollution of cannot afford for pollution treatment. In paper-making industry, about 0.1 billion Yuan investments was required for constructing a set of 150-ton daily-processing alkaline recovery system facilities, which accounted for one half of the total investment of environment protection. The running fee may account for 10% of the total sales cost.

For small and medium enterprises, due to small scale and limited technology, pollution treatment cost was much higher than the possibly-gained economic benefit. Enterprises run for their maximum profits and took this excuse to decline for paying pollution cost even though they have sufficient capital. Meanwhile, some sewage-discharging enterprises could adopt distorted market price based on their illegal benefit. Management policies of government competent authorities were not perfect without formulating the relevant policies to encourage enterprises for pollution treatment, which weakened the initiative of pollution treatment of enterprises.

Environmental protection required government management and input, as well as the initiative implementation of duties. Only under this circumstance can people win victories over pollution control (Zhou 2009). Constructing a society with beautiful environment had been the common expectation for all people.

Industrial Development and Environmental Issues

China had been on the way of developing onto the medium phase stage of industrialization and the quick developing phase of “heavy industry”. During this process, specific features and deficiencies were shown and were unavoidable to affect the environment. However, the traditional and lagged industrial development road was unfeasible. People must explore a newly-industry developing strategy combining harmony in environmental protection with economic development.

Sticking to the newly-industrialization road with Chinese situation would be a good option. It was, therefore, necessary to blaze a new trail to industrialization featuring high scientific and technological content, good economic returns, low resources consumption, little environmental pollution and a full display of advantages in human resources. Constructing newly modernized industry park was the effective means of quickening the modern industrial development. “Revitalizing the city” was the development strategy put forward by Guilin, Guangxi Zhuang Autonomous Region.

Therefore, Guilin City took the construction of unique industrial park as the lead and made heroic efforts to establish hundreds of billion Yuan industrial park. In 2012, Guilin City completed its industrial output value by 95 billion Yuan, increased by 26.3%. Total industrial output value of the park accounts for the total industrial output value of Guilin City exceeds 50% (Xu and Luo 2012). Typical experience could direct a direction. Places with good conditions required initiating for actions in variant aspects including systems and mechanism, scientific integration, investment and financing system, land consolidation and international innovation, to improve capability of independent innovation and construct modern industrial park (Hong 2010). Based on this, it could promote the development of open economic system mode and improve the quality of economic and social development.

Promoting the industrial development and environment protection shall turn back to sci-tech innovation fundamentally. According to the data issued by High-Tech Development and Industrialization Department of Ministry of Science and Technology in 2012, there were over 59,600 high-tech enterprises calculating from the reported materials from national 88 high-tech industrial developing zones. The total industrial output value of national high-tech industry exceeded 10 trillion RMB, with 2.74 trillion RMB of industrial added value, 767.2 billion RMB of net profit and 661.3 billion RMB of the paid taxes. Industrial added value accounts for 12.4% of the national secondary industrial added value, hitting a new high in history (Huang and Gao Jing 2012). However, science and technology made progress with every passing day. Industrial enterprise shall constantly improve the high-tech R&D capability and quicken the transformation and update. Heroic efforts shall be made to highlight key cultivation and develop strategic newly-rising industry and realize breakthroughs in fields of energy, transportation, and information remote sensing and new materials.

China had formulated 9 environmental protection laws, 14 natural resources protecting laws, 800 national environmental protecting standards so far, and had formulated and issued over 50 environmental-protecting administrative laws and regulations, about 200 regulations and specification documents, over 10 military environmental-protecting laws and regulations, as well as over 1,600 local environmental-protecting laws and regulations formulated by local people’s congress and local governments. Some implementing details and local laws and regulation constructions, however, were relatively lagged. The loss of restraint power was thus caused. Due to the loss of legal restraint, some illegal activities were prevailed.

For example, Rent-Seeking actions of public-right entrusting agent couldn’t be stopped despite repeated prohibitions. These rent-seeking actions were the source of corruption. Not only were they causing the imbalance of cost-income, but also, they were emptying the national economy dam, damaging the socialist national security (Zhong and Wang 2010). Thus, we must perfect the construction of environment protection law system, especially the pertinent detailed implementing specification. Meanwhile, law enforcement shall be strict according to the pursuant laws. Corruption and crime commitment shall be punished severely to rectify and standardize the market order of industrial economic development.

Environment-protecting objective-responsibility system at all levels shall be formulated and implemented. By means of signing Letter of Responsibility, construct the administrative management

system in which local governments at all levels and polluting units are responsible for the environment quality. For example, perfect urban environment rectifying testing system shall be established. Through quantitative testing, the activities of comprehensively urban environment treatment of urban government shall be managed and adjusted. While constructing projects, the specification of the 26th Article of “The Environmental Protection Law of the People’s Republic of China” shall be guaranteed for execution “the implementation of pollution prevention and control in construction project must be used with simultaneous design, simultaneous construction and simultaneous production”.

The article “Three-Simultaneous” presents a fundamental system and regulations in Chinese environment management. Any actions violating this system shall be punished according to the legal liability regulated by the 36th Article of this Law. There were also four principles to follow. They were such as that the principle of comprehensive decision-making on environment and development. The principle of environmental impact assessment should be followed according to law for conforming to the idea of environmental carrying capacity. It must keep to the concept of equal emphasis on polluted control and ecological protection.

SUMMARY AND CONCLUSION

Industrial enterprises formed the main part of market economy. Its development had gone through a very tough time. Making profits was undoubtedly significant, but the all-around objectives of running enterprises could not be neglected. Purely exploiting mineral resources and chemical products at the cost of environmental pollution and resources consumption was proved to be not sustainable. On one hand, mineral and industrial enterprises wanted to make profits by manufacturing products. On the other hand, people shall complete the overall task of China national environmental protection (Zhang 2017).

According to the planning outline of “the Thirteenth Five-Year Plan”, the national industrial field task of energy saving and emission reduction is that the Chinese unit energy consumption of industrial added value, emission amount of carbon dioxide and water using amount in 2016 shall be lowered by 18%, 18% and 30% than those of 2010. The comprehensive utilizing ratio of industrial solid waste shall be improved up to 72% or so. Thus, the extensive economic growth mode must be deserted. We shall structure circulating industrial system and fulfill the policies and measures of energy-saving, water-saving, materials and land saving (Dong 2010). Enterprises shall carry out and implement clear production, make heroic efforts for the innovation and application of all energy-saving technology and realize the win-win objective of production increase and environmental protection. Industrialization changed the living way of the human and pushed forward the human kind civilization to new phases. In the 21st century, industrialization would continue to promote the harmony between human kind and the nature and provide more green products.

As one of the most important material production departments of national economy, industries had been playing a leading role in the national economy of each country. China developed national industries based on poor and blank basis. With over 60 years’ efforts, industries developed fast and meanwhile triggered environmental problems. The industry layout influenced the industrial structure directly, and the unsuited show of local benefits of the industry layout had been a crucial factor, which caused environmental pollution. For future view, main factors causing environmental pollution should be studied further, accumulative reasons should be looked through systematically, policy suggestions should be proposed for the win-win model between industrial construction and environmental protection, specific Chinese socialized way of industrialization should be followed by all people all around (Hou 2017).

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