© Kamla-Raj 2019 J Hum Ecol, 65(1-3): 91-106 (2019)
PRINT: ISSN 0970-9274 ONLINE: ISSN 2456-6608 DOI: 10.31901/24566608.2019/65.1-3.3144

Environment and Development Issues in China

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KEYWORDS Environmental Protection. Five-year Plan. Innovation. International Trade. Technical Barriers

ABSTRACT Based on current conditions of China, it analyzes some environmental degradation cases from domestic and international perspectives and identifies domestic and international causes for environmental problems. The impacts of international market technology barriers on the Chinese development and environmental protection, represented by the three directives of the European Union, have been particularly discussed. The key role of innovation in the construction of environmental protection is singled out because of its casual contribution towards environmental protection. It is proposed to constantly improve legislations and regulations to properly handle the interests of the state, enterprises and individuals, and to enhance the cooperation with all countries in the world to jointly cope with environmental issues at international level.

INTRODUCTION

The interaction between human activities and the natural environment has been affecting the development of the world for a long time. It has attracted more focus throughout the world because of its relevance with the social and economic development, protecting the environment needs, innovative spirit, and many proprietary technologies to continuously create high-quality products in economically productive activities. However, the development history is twists and turns, therefore, there is a lot of benefit game in the environmental problems, and the "Nash Equilibrium" usually exists in a variety of situations (Trejo et al. 2017).

Objectives

The researchers applied the game theory to discuss in detail the influence of distribution of interests and the theoretical analysis of "Nash Equilibrium." Then the researchers analyzed some cases that caused environmental deterioration by pointing out some domestic causes of such incidents. At the same time, the international market technology barriers represented by the three EU directives are particularly referred to. After that, the researchers proposed some suggestions to solve the problems by stressing on continuous formulation and improvement of the laws and regulations to judiciously handle the disputes of interests among the state, enterprises and individuals, ultimately scoring the objective of protecting the environment through unremitting efforts for this (Ceparano and Quartieri 2017). Finally, it is important to realize that China's environmental protection is not only related to the domestic factors, but also related to the international environmental. Therefore, it is clear that in the complicated international climate change negotiations, China must continue to play its role as a responsible large country in international climate change negotiations remaining within the framework of the UN.

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MATERIAL AND METHODS

The current research paper is a content-based research outcome, as such, the researchers mainly adopted a literature review and documentary research methods. A content-based analysis is a pure qualitative research method. It is a detailed and systematic examination of the contents of a specific material for identifying configurations or subjects (Mogalakwe 2006). The use of documentary methods refers to the analysis of documents that contain information about the phenomenon the researchers wish to study (Bailey 1994). Documentary method as the techniques can be used to categorize, investigate, interpret

and identify the limitations of physical sources, most commonly written documents whether in the private or public domain (Payne and Payne 2004).

Documents range from public to private documents. The documents of government publications, such as Acts of Parliament, policy statements, census reports, statistical bulletins, reports of commissions of inquiry, ministerial or departmental annual reports, consultancy reports, are listed as public documents. Private documents often emanate from civil society organizations such as private sector businesses, trade unions and non-governmental organizations, as well of course from private individuals (Mogalakwe 2006). The current researchers mainly collected over hundred government documents and news reports, based on which they made a throughout review and systematically presented them in the paper.

OBSERVATIONS AND DISCUSSION

The inherited, conservative thought flutters around because of the long-term existence of the traditional large-scale machine production mode. It can be seen everywhere in the world that, for pursuing self-interests and profits, resources are being plundered and environment is being sacrificed. Hence, the ecological environment has been deteriorating in the world, and, as a result, the development of human civilization is facing a great crisis. How to break this vicious cycle of tough situation? In the authors' opinion, the first prerequisite is innovation. Admittedly, innovation is very difficult with a serious and tortuous process (Zhang 2013).

Activities for Environmental Protection

In the long history of China, innovation is the power source of social progress, and the innovation represented by the four great inventions in Chinese feudal society is not only beneficial for the Chinese nation, but also for all the mankind. Innovation is a powerful source of social progress. Karl Heinrich Marx praised the great innovations of the gunpowder, the compass, the printing, and so on, as they opened a new era of human society. He declared gunpowder, compass, and printing as the three great inventions predicting the arrival of the bourgeois society. Gunpowder smashed the chivalry, the compass opened the world market and established colonies, and printing became a Protestant tool. In general, it becomes the means of scientific rejuvenation and becomes the most powerful lever to create the necessary premises for the development of the spirit (Marx 1863). Gunpowder, compass, printing, and papermaking are four great inventions of ancient China. They have profound influence in the world after they have been abroad. The four great inventions especially played a key role in promoting the progress of European Renaissance. These advancements include the fields of science culture, production technology and social politics.

After the establishment of The People's Republic of China, especially since the reform and opening-up, the innovation has been strongly supported by the governments at all levels. Deng Xiaoping attached immense importance to the scientific theory and technological transformation, considering it as the only way to improve social productivity. Deng pointed out: introducing technology to transform enterprises, the first to learn, second to improve innovation (Deng 1978). How to master the modern technology and improve the production efficiency? Deng clearly said: to master the modern technology to be good at learning, but also to be good at innovation (Deng 1984). Under the guidance of the innovative ideas, the national innovation activities have been flourishing for decades.

The global economy is now growing gradually. Under the recovery context of global sharing economy, China's economy is further integrated with the international economy. Economy of China accounted for about a third of global economic contributions in 2017. An important concept of Chines economic development and peaceful construction is to act up to socialist ideology of Xi Jinping's new era with Chinese characteristics. China's vision is to build a human community. Chinese people are working hard to achieve this goal by joining hands with international friends and overcoming difficulties.

A Significant Increase of Investment

It is the first decision for Chinese innovative development to put forces in the number of sci-

entific research institutions and patent applications. The implementation of innovation activities needs the material basis. In the social and economic life, the scientific research institution is the base of innovation, and the invention patent is the typical innovation result. During the implementation of the two five-year programs' period from 2000 to 2010, the quantity of innovation base and the amount of patent application in China have increased greatly. Until 2010, the state established 127 National Engineering Research Centers Based on industrial enterprises and set up 729 state-level enterprise technology centers, it was 2 times as much as the initial period of the Eleventh Five-Year Plan (2006-2010); 5532 provincial enterprise technology centers, compared with the number in 2007, increasing more than 1500. The state sponsored enterprise technology center in 2010 spent more than 180 billion RMB *yuan* on R & D investment, which is 4.2 times than that in the early "Eleventh Five-Year Plan". According to the same caliber, the average annual growth rate increased by 21.4 percent over the 5 years, the scientific and technological personnel of large and medium-sized industrial enterprises reached 2468.2 thousand, accounting for 5.19 percent of the employees (Zhang 2017).

Because of the establishment of many scientific and technological research centers at all levels and the increase of many scientific and technical personnel and business, the national patent application volume blowout. Statistics show that, during the period of the Eleventh Five-Year Plan (2006-2010), China's patent applications increased rapidly to 1451 thousand invention patents that were applied, which is 2.6 times of the period of the "Tenth Five-Year Plan (2001-2005)." In 2010, there were more than 391 thousand patent applications for inventions, the second largest in the world. During the period of the "Eleventh Five-Year Plan", the patent applications of utility models and designs in China were 1289 thousand and 1554 thousand, respectively, which is 2.4 times and 3.1 times that of the "Tenth Five-Year Plan (2001-2005)", keeping the first position in the world. During the period of the Eleventh Five-Year Plan (2006-2010), the State Intellectual Property Office granted 50 gold awards for Chinese patents, including 5 Chinese design gold awards, and 525 outstanding Chinese patent awards, including 32 Chinese Design Excellence Awards.

The pace of innovation in China has accelerated in recent years. During the period of the "Twelfth Five-Year Plan (2011-2015)," the number of Chinese invention patents were 1.189 million, which were 1.5 times higher than that of the Eleventh Five-Year Plan (2006-2010). Over the same period, China's intellectual property rights had been rapidly improved, and the contribution of intellectual property rights to economic and social development had been significantly increased. The total amount of Chinese patent pledge financing reached 153.3 billion RMB *yuan*, with an average annual growth of 58 percent, benefiting more than 5,000 enterprises. Recent sales of 120 gold award projects totaled 62.1 billion RMB *yuan*, with additional profit of 131.7 billion RMB *yuan*. The amount of patent license for the record were nearly 40,000, and the sum of license amount were 25.7 billion RMB *yuan* (Zhang 2016). According to the World Intellectual Property Organization (WIPO), China received over a million patent applications as the first year in 2016, with an increase of 18. 7 percent in patent applications, the highest in the world for five consecutive years (Wang et al. 2016).

With the support of patent technology, the national economy has developed rapidly, and the people enjoy a large quantity of high quality and green products, and the living standard has been improved (Wang and Tian 2012).

Incremental Number of International Patent Applications

Science and technology are the primary productive forces. Trying to achieve the more number of international patent applications is a worthy goal. China's innovation activities cross national boundaries and move towards the world top ranks in some fields. The international patent application submitted by the worldwide recognized, the Patent Cooperation Treaty (PCT), reflects the innovation ability of a country, a region or an enterprise, showing the technological value and market value of the innovators. The statistics released by the World Intellectual Property Organization (WIPO) on March 6, 2012 showed that China's PCT international patent application increased significantly as compared to those in 2009. It has been ranked first in the world for 3 consecutive years. China's PCT international

patent application growth rate was up to 33.4 percent in 2011, 12 percentage points higher than that of Japan, which was second in the year. In 2004, China's PCT international patent application volume was 1706, ranking the top 10 in the world. In 2011, China's PCT international patent application volume was 16406, and entered the fourth place in the world. In 2011, the deep impact of the international financial crisis, which originated in the US Wall Street, continued to emerge. The European sovereign debt crisis was constantly fermented, and the economic development of western developed countries such as North America and Europe were facing difficulties. In contrast, the emerging countries had a significant growth. The development trend of the world economy was reflected in the change of PCT international patent application (Zhang et al. 2017).

Achievements in More Innovation of Environmental Protection

The beautiful environment with fresh air and clean water is desirable. Scientific and technological innovations help us achieve the beauty. Innovative performance is very prominent in the field of environmental protection, and the outstanding achievements of science and technology are constantly emerging. Whether intellectual property creation, environmental science basic research and management technology creation, or energy saving and emission reduction, water pollution control and air pollution control, accumulated research attainments have emerged. Statistics show that in the period of the Eleventh Five-Year Plan (2006-2010) 227 achievements in the national environmental protection science and technology achievements were awarded at the national level. Among them, there were 36 scientific and technological achievements in 2006, 41 awards in 2007, 48 awards in 2008, 62 awards in 2009, and 40 awards in 2010. Among the awards, there were 21 first prizes, 78 second prizes and 128 third prizes. These awards involved the fields of water, air, soil, solid waste, noise, ecology, rural areas, nuclear radiation, environmental emergency, environmental monitoring, environmental information systems, and environmental risk assessment. These technological innovation projects have both the achievements of major scientific research programs for the joint research on watersheds and key environmental issues in the region, as well as the achievements of enterprises in independent innovation to solve specific technical problems; both the direct service for environmental management systems, technical regulations and standards of research results, but also the key technology, key equipment and complete equipment of controlling source reduction (Wang and Tian 2012).

Personnel of scientific research institutions in Western China have worked hard to overcome the difficulties, and many award-winning technical achievements came to the fore. For example, "Research and application of a new generation of integrated oxidation ditch wastewater treatment technology in small towns of Guizhou province" project has designed a new sewage treatment facility, adjusted the operation parameters and improved the sewage treatment efficiency. As another example, research and demonstration project of sewage treatment technology and reuse technology in high and cold areas project, it has constructed a cold resistant microbial community system (Hou 2017). Under low temperature, it can still guarantee the quality of effluent reaching the first level a standard. Compared with the similar technologies, the land area can be reduced by 30 percent, the investment can be saved by 25 percent, and the running cost can be reduced by 20 percent. As another example, "Study on the risk and countermeasures of water pollution events in China's transboundary river" project established multi-objective decision making computer model and standardized input benefit evaluation system and proposed a risk analysis method for cross boundary river pollution events, which laid a methodological foundation for China's environmental foreign policy and strategy research (Zhao and Ren 2012). These award-winning projects have achieved remarkable results. They have made outstanding contributions to solving major environmental problems and raising the level of environmental management and environmental science and technology.

Deng contended as Marx said that science and technology are productive forces, facts have proved that these words are right. In my opinion, science and technology are primary productive forces (Deng 1988). The benefits of environmental protection science and technology and their

award-winning technological achievements are very clear, and these facts fully demonstrate this glorious conclusion. To achieve the goal of building an environment-friendly society, we must continue to vigorously develop science and technology on environmental protection in the future (Li 2017).

After the establishment of The People's Republic of China, it has been the direction for people in all walks of life in the country to transform the country's inheritance coming from thousands of years of small-scale peasant economy to a modern, industrialized nation, and remarkable achievements have been made. After a long period of studies, some scholars of the Chinese Academy of Social Sciences and the Institute of Industrial Economics of the Chinese Academy of Social Sciences evaluated some comprehensive indicators and analyzed that after the implementation of the "Tenth Five-year Plan (2001-2005)," the level of China's industrialization development comes under the second half of the mid-industrialization period or the period of high degree of industrialization in the period of heavy-chemical industrialization (Chen et al. 2009).

In the latter half of the implementation of the Eleventh Five-Year Plan (2006-2010), the composite index of China's industrial modernization level exceeded 36.7, which means that the overall level of China's industrial modernization has surpassed 1/3 of the world's most advanced level, in other words 1/3 of the way has passed in the country's modern industrialization (Chen et al. 2009). However, many scholars of the world think that, based on the historical experience of some industrialized countries, there will be many difficulties in the industrialization and development after this stage and the process will be even more arduous. There are many reasons for these difficulties, including objective reasons as well as subjective reasons (Liu and Liu 2017).

Recognizing the Difficulties and Facing the Challenges

Although rich in natural resources and abundant labor resources, China is also a large country with a relatively low per capita natural resource ownership. China's total water resources account for 7 percent of the world's total water resources, ranking sixth. But only 2400 m^3 per capita, accounting for 25 percent of the world's per capita water consumption, ranking the 119th in the world and one of the 13 water-deficit countries in the world. Owing to the demographic factors, the per capita arable land and grassland resources in China are 1/3 of the world average; and per capita forest resources are 1/5 of the world average. Because of the historical legacy of the irrational economic structure and management system imperfections, there is a weakness in China's industrialization with a low level of technology and a mismatch in its structural mix; they inevitably lead to low efficiency, resource depletion and environmental damage. Such structural and technological maladjustment may lead to increased consumption in production, a large backlog of products, or idle production equipment, resulting in direct waste of resources (Gao 2016).

Severe Environmental Pollution

In contrast, the comprehensive utilization rate of mineral resources and water resources in China is only about 25 percent of the comprehensive utilization rate of developed countries. The consumption intensity of iron, wood and cement is 3 to 5 times, 4 to 7 times and 8 times of developed countries respectively. The depletion rate of China's large mineral reserves is much larger than the annual growth rate of reserves, and the production reserves of production mines are depleting (Du 2011).

The production of 2/3 of the major non-ferrous metal mines in China reaches the middle and late stages, making the scale of mining development and production capacity severely restricted. China's per capita relative share of resources is low; its consumption intensity is high; and its management philosophy and methods are obsolete and backward. The result is that the losses caused by the damage to ecology and the environment during the construction in the whole country are huge, and the amount calculated in terms of value amounts to an astonishing level. The proportion of its share of gross domestic product in the beginning of this century exceeded 9 percent. Considering the intangible loss of environmental resources, by pollution, the economic growth may even be called negative growth in some respects (Geng 2017).

In recent years, with the increase of environmental problems and the improvement of people's awareness of environmental protection, the

issue of environmental pollution has not only become an important restriction factor for the industrialization of the country but has also become a new inducement for mass incidents. Incomplete statistical data on the situation of environmental disputes throughout the country shows thatÿfrom 1995 to 2006, the total number of letters from the masses was 58678 in 1995; and 616122 in 2006. The number of environmental letters and visits has increased by 10 times over the past 11 years (Yang 2008). Some of the letters and visits have not been properly solved, and some of them are converted into group events. In August 2009, a lead and zinc metallurgy enterprise in Changqing town, Fengxiang county, Shaanxi province, named Shaanxi Dongling smelting company, exceeded safety standards because of long-term lead emissions; its testing found that it led to environmental pollution disaster. It resulted in making 615 of the 731 children have blood lead over the standard in the surrounding Mao Daokou village and Sun Jia Nantou village of Changqing. After a reliable test, a total of 851 children under the age of 14 were found to have excessive levels of lead in their blood. One hundred seventy-four children with blood lead levels exceeding 250 micrograms per liter were moderately to severely lead poisoned (Bai and Zhang 2017).

In the morning on August 16, 2009, hundreds of angry villagers near Dongling Smelting Co. hit the Dongling Plantation. This factory's special railway line of nearly three hundred meters fence was overturned; the windshield of the more than 10 large trucks and engineering cars (used to send coal to the province) was smashed; hundreds of local police were stationed in the incident area to maintain order (Zhang 2009). After the incident, government of Shaanxi province, Baoji city and Fengxiang County, and the Dongling Company, took active treatment and economic compensation for sick children. It also invested 300 million yuan and implemented a whole off-site relocation project for 425 villagers in the lead threat area. The villagers were relocated to the safety zone 1350 meters away from the enterprise. This incident didn't happen without any warning from the community side. In fact, before the children's lead poisoning broke out, the villagers in Changqing town had already had clashes with the local administrative authorities and the Dongling Smelting Company for several times, but in the end, because the company can pay huge profits, the problem was always brought to a dead end. It is typical, and people criticized of unscrupulous behavior (Dong 2010).

Avoiding Escalation of the Situation

The problem of environmental pollution in China has been severed by the process of industrialization. It has been criticized by the domestic public. Moreover, it also affects China's international image. Organization for Economic Co-operation and Development (OECD) is an intergovernmental international economic organization consisting of 34 market economy countries. A report of this organization published in 2007 announced, "China's economy is rapidly approaching to the developed countries, but the environmental level is like the poorest countries in the world". In 2009, the American Forbes magazine once published a report on the issue of the People of China are Difficult to Allow Children to be polluted. The article stated: China has become a world factory, but many places have not implemented environmental protection measures. The result is that the rural pollution near the coal factory is very serious, and a layer of dust will be covered on the newly parked car windshield. Many rivers in China are also polluted, no longer suitable for industrial use, not to mention being used as a drinking water (He and Chen 2012).

The media in Japan, South Korea and other countries often take the issue of China's environmental pollution and are trying to shape China into a dirty neighbor. It seems to some people in these countries that the dust storms in China have crossed the sea to Korea and Japan. The Daily Telegraph published an article in the UK, without the gentry's rendering language that the British are often proud of it. It asked whether China would be drowned by its own waste water before taking over the world. For these indecent and obviously biased foreign opinions, Chinese must have the correct attitude. On the one hand, face the question candidly; on the other hand, express their views clearly. The serious environmental pollution in China is a fact, but some foreign enterprises in China can't escape. For example, a lot of Japanese enterprises only do some low-pollution and high-added value businesses after the end of product design and production, and the middle pollution links are set up in China. Many European and North American countries have already

transferred certain high-pollution and high-emission products to China. Some of these have objectively formed a situation where China is assuming environmental responsibilities (Mu 2013).

In brief, China's environmental situation is a mixed development during the implementation of the period of the Eleventh Five-Year Plan (2006-2010). The exciting new highlights from China are: Energy conservation and emission reduction have achieved initial success; emission of pollutants has dropped for the first time; and Beijing's green Olympic construction has achieved its stated goals. Of course, some environmental phenomena are worrying. For example, water is the source of life. However, the data released by Ministry of Environmental Protection (MEP), National Development and Reform Commission (NDRC), Ministry of Finance (MOF) and Ministry of Water Resources (MWR) indicates that China's water environment is still not optimistic until 2010. Liaohe River and the middle and upper reaches of the Yellow River are heavily polluted; the river around the lake in Haihe, Chaohu, and Dianchi are seriously polluted.

According to some scholars, the outbreak of cyanobacteria pollution in Taihu Lake in Jiangsu Province in 2007 shows that the pollution of rivers and lakes in China has reached a critically dangerous point; subverted the previous development mode of pursuing GDP growth at the expense of the environment; and thus, the number of mass incidents involving environmental issues has increased. It is because the lagging traditional economic development model still has a strong negative inertia. The special interest groups formed by some local selfishly self-reliant persons for continuing to plunder their natural resources because they are unwilling to renounce their benefits (Friends of Nature and Yang 2007). In short, the environment in China still has not gotten rid of the crises. Some deep-rooted contradictions continue to outbreak. The environment protection has been struggling with the transformation, and the tension in the interest game has been disrupted. In-depth study of multi-stakeholder games around environmental issues and identifying the crux of the problem will be very conducive to the protection of the environment and improve the speed of construction and development (Peng 2017).

Causes of the Deterioration

China's industrialization has just finished 1/3 of the journey. The overall level is still relatively backward. At the same time, it is also limited by the un-emancipation of thought and understanding; and the national economic construction has taken some twists and turns in its development. In addition, the competition in the international market economy is very fierce. Some industrialized countries are double-faced for the sake of their interests. Some international and domestic factors are often intertwined, forming some negative effects. The construction of China's coke production and export trade twists and turns and other product exports which encountered technical barriers are typical examples. Trade profitability and environmental degradation, the current performance of this contradiction is very prominent, indicating that the Chinese industry must aim at the correct direction, promptly correct some of the mistakes for sustainable development just like a large ship sailed in the choppy ocean to grasp the course, and to identify the storms to continue to move forward (Sheng 2017).

Tortuous Development Process

China is a developing country with a low level of industrialization. Production and export trade of many products are at a low level. This is an unavoidable historic stage in the growth of a country. However, it is not easy to go through this initial stage. Particularly, due to the complicated and fierce political and economic competition in the international community, the Chinese people have encountered many serious challenges in the process of progress (Zhang 2017).

Public Welfares and the Prospect of Profits

How do we balance public interests and economic profits reasonably? The products produced by a country in the initial stages of industrialization are not high-end level; they all must produce low end products. In the early twenty-first Century, China used to produce a large amount of coke for export trade and accumulation of funds. In 1985, China exported over 6 million tons of coke. In 2003, the country's coke production reached 178 million tons, and the export volume was 13 million tons. China has become the world's largest producer and exporter of coke,

accounting for 45 percent of the world's total output and 60 percent of world trade. Coke production has brought good profits to China. Since 2003, the domestic market price of coke rose from 300 RMB *yuan* per ton to 1,300 RMB *yuan* per ton (Zeng and Sun 2011).

Similarly, affected by the supply-demand relationship, coke prices in the international market soared from an average of about 200 US dollar per ton in 2003 to more than 400 dollars per ton in the first quarter of 2004. In a brief period, this market price and profit index have a strong inducement. Therefore, to obtain high profits, some enterprises blindly expand production and blindly invest in the construction of coke projects, which leads to serious duplication of investment. Some unapproved, private coke projects are everywhere. In 2003, Chinese coke production was 180 million tons, and the output of coke exceeded 200 million tons in 2004. A lot of money continues to enter the coke industry. In 2005, there were about more than 700 large-scale coke enterprises in China, including more than 1900 large and medium sized coke oven, among them, the output of small technology of "small coke oven" was about 40million ton (Wang and Mao 2011).

As the price of coke continues to rise, the production of small soil coke with no pollution treatment measures continues to rise, and Chinese coke production capacity is increasing. At the end of 2005, the annual production and sales of coke in China were about 3 million tons, and the production capacity exceeded 4 million tons, and the production capacity was unnecessarily high. With the rapid development of coke industry, coke oven capacity expands rapidly, and the coke industry is not normal and super high-speed growth. There is only one reason that the coke price is high (Dong 2010).

Situation of the "Two Highs and One Resource" Industry

The problems of the "two highs and one resource" industry are getting more prominent. Coking is a typical "two highs and one resource" industry with high energy consumption, high pollution and resources-orientation. In China, the level of coking technology and equipment is less than that of developed countries, and the processing and utilization of coking by-products are backward; thus, causing serious pollution. Under the existing conditions in China, one ton of coke is made of two tons of coal, which consumes a large amount of energy. According to the test, the production of one ton of Coke will produce about 400m3 gas. In the process of coking, a great quantity of dust, carbon monoxide and toxic gases will be discharged into the atmosphere, which can cause cancer or deformity. The tar and waste water discharged from the coking unit also contain a large amount of toxic substances which will pollute the groundwater for a long time after infiltration into the ground. However, to gain profit, many soil coke ovens make production continuously. Such small soil coke production technology is backward; causing serious waste of resources, and environmental pollution (Gao 2016).

Taking Shanxi province as an example, in the early 2006 of the Eleventh Five-Year Plan (2006-2010), 92.02 million tons coke was produced in the province, accounting for 33 percent of the country's output. Shanxi province has 13.30 million tons of coke from its own-export and export-trade, accounting for 89.8 percent of China's coke trade volume, accounting for 40.5 percent of the world's coke trade. However, coking industry is a typical high pollution and high consumption industry. The coking process will produce a lot of waste gas, waste water and solid waste. It is one of the most pollution causing industries (Sheng 2017).

In September 2006, the former State Environmental Protection Administration announced that the air quality of 43 cities in the country was inferior to the third standard, of which the Shanxi province accounted for 16. Shanxi coking industry pollution load on the air and water accounted for the province's total pollution load of 40 percent and 30 percent. Inferior class V water accounted for more than 70 percent, much higher than the national average of 44 percent. The coke industry has brought economic benefits to Shanxi, as well as resource consumption and environmental pollution. Shanxi is the largest province of coke production and the most polluted province in China. As the former granary of Shanxi Fenhe valley, due to the backward operation of coke production mode, especially the operation mode of small coke and improved coke, the result is that black smoke billows in the area; air pollution is serious; water pollution is serious; and less farmland can be cultivated. In a brief period, there are many areas with serious air pollution in

Shanxi province. Under the condition of no wind or breeze, the state of the sky is dim and the smell is smoky. It has a serious impact on the ecological environment and the physical and mental health of the local people (Li 2017).

Recognizing the Essence of Trade Disputes

In sharp contrast, the western developed countries, to protect their environment, reduce coke output and even ignore the development of domestic iron and steel industry, and close a lot of coking plants. It is reported that from 1996 to 2000, the production of coke was reduced by 10.17 percent in the United States, 9.9 percent in Japan in the same period, 7 percent in Germany and 18.3 percent in Britain. Australia is a resource rich country of iron ore and coking coal. Because of environmental cost considerations, Australia does not develop iron and steel industry and coke industry, but only exports iron ore and coking coal (Wang and Tian 2012).

From 1998 to 2004, the entire world has closed the productive capacity of nearly 18 million tons of coking plants, most of them in Europe and the United States. Owing to the closure of many backward coking coal productive plants in the European countries, the local coke productive capacity is further shrinking. The coke resources necessary for the development of iron and steel enterprises are heavily dependent on Chinese exports; such things appear more in the European Union (EU). In 2003, the European Union imported about 4.4 our million tons of coking coal from China, accounting for 31 percent of the annual consumption of coke in the EU's steel industry (Liu and Liu 2017).

The developed countries shut down their coking plants, but they transferred coke production and pollution load to China. That is why the EU has made a 180 degree turn in the attitude of China's coke exports. In 2003, the European Union also listed imported coke from China as an anti-dumping product and levied an anti-dumping duty of 32.6 euros per ton. Times change, at the beginning of 2004, the relevant departments of China proposed that the export quota of Coke will be reduced by 3 million tons in that year. On May 7 2004, the EU threatened to appeal to WTO for China's action to restrict the export of coking coal. In the end, China pledged to export 14 million tones more than that of 2002 so that a bigger trade dispute upon which was about to begin to wrongfully impose Chinese to bury the hatchet briefly (Yang 2004).

On June 23, 2009 the United States and the European Union put forward a trade dispute request to China in the WTO framework again, accusing China of 9 kinds of raw materials export violation. China repeatedly stressed that the quota system is the need to protect the use of the natural resources and environment. Unfortunately, on July 5, 2011, the WTO still ruled "China's violation". Subsequently, China appealed the result of the preliminary ruling. However, the Panel of Experts on WTO appeals maintained the core of the preliminary ruling that China's export tax and quota on various industrial raw materials violated the WTO rules and rejected the appeals filed by China on the preliminary ruling based on environmental protection or supply shortage. On January 30, 2012, the WTO ruled again on China's restriction on the export of nine raw materials, also maintaining the core penalty of the preliminary ruling in July 2011, confirming that China's export tax and export quotas on raw materials for the steel and chemical industry run counter to the rules of international trade and must be corrected (Li 2012).

The ins and outs of things are clear. On the one hand, China was constrained by the historical stage of its development and had to produce "two highs and one resource" products. On the other hand, when the production of these products was diminished, it immediately brought unwarranted accusations from the industrialized countries. On the contrary, some industrialized countries have used historical opportunities and technological advantages to stop or transfer highly polluting products, letting developing countries produce such low-end products, and they consume at high-end. "Behind will be beaten" is a popular expression, but also a profound truth. The Chinese people should maintain their normal attitude and catch up with each other and rise peacefully (Zhang 2017).

Recent Changes in International Trade

The experience of coke production and export is only a tribulation encountered by the Chinese people in the construction. In the high-tech era, there are still more difficulties to be faced.

Significance of the Technical Standards

Low-carbon economy is the general trend of development in today's world where market competition is very fierce. Environmental factors are outstanding in the field of low-carbon economy. As a result, China faces more challenges in its development. Some scholars have shown that transition of the traditional economy to a low-carbon economy to achieve the desired goal of success requires 62 kinds of key technical expertise and common technology support. Mainly, due to historical reasons, among the 42 key technologies, China currently does not have the core technology. For example, relevant experts estimate that China's current energy efficiency is only 33 percent, about 10 percentage points less than that of the international advanced level (Du 2011).

Higher energy consumption per unit product of 8 main energy consuming industries, such as electric power, iron and steel, non-ferrous metal and petrochemical, is higher than the world advanced level by more than 40 percent. The reason that led to this situation is that some key core technologies are not mastered. The difficulties encountered in the production and export of coke, in fact, is the lack of technology and management, for example, the level of technical equipment is not high, the productive process is backward, and the environmental protection is not well managed, and so on. In the most basic measure of the quality of the product, there is still a defect in management and technology. For example, the foundation of standardization work in China is still weak and lags behind the international advanced level. These include the overall low standards, the slow development speed, the lack of high-tech standards, the unsafe safety standards system and the lag in resource conservation standards, which have become inaccessible to the country's economic and social development requirements. Facing the severe international and domestic situation, it has become a very urgent task to speed up the development of standardization (Geng 2017).

There are the new standards of three challenging instructions in environmental protection. The criteria for measuring things and their formulation seem simple, but they are not so. During the period of China's Eleventh Five-Year Plan (2006-2010), the European Parliament and the Council of Ministers of the European Union adopted three instructions with environmental protection contents and affecting international trade, commonly known as environmental protection directives. After these standards were put forward, some manufacturing enterprises in China immediately placed themselves in serious challenges. Waste Electrical and Electronic Equipment (2002/96/EC, WEEE), came into force on August 13 2005. The core content of the WEEE instruction is that the manufacturer of electronic and electrical equipment circulated in the EU market must be legally responsible for the cost of reclaiming waste products (Mu 2013).

New Instructions of EU Trade

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (2002/95/EC) is abbreviated as "Restriction of Hazardous Substances (RoHS)." It came into force on July 1 2006. The core content of the RoHS directive is that the contents of 6 substances in the new electronic devices which are put into the EU market must not exceed the standard. There are 4 kinds of heavy metals: lead, cadmium, mercury; 2 kinds of bromine flame retardants with polybrominated two benzyl ether (PBDE) and polybrominated biphenyl (PBB).

The WEEE and RoHS instructions put forward high environmental standards for mechanical and electrical products. The EU market prohibits the entry of standard products. In fact, China's mechanical and electrical export enterprises have suffered a great deal of impact, and they have reached thousands of enterprises and about 200000 kinds of products. The product, which was affected by the directive, accounted for 71 percent of the electromechanical products exported to the European Union, with a total value of about $37 billion dollar (Li 2017).

Establishing a Framework for the Setting of Eco-design Requirements for Energy-using Products and Amending Council Directive 92/42/EEC of the European Parliament and of the Council (2005/32/EC)" abbreviated "Energy-using Products (EuP)", was entered into force on August 11, 2005. Before August 11, 2007, the EU completed the necessity to comply with this directive of the domestic legislation and administrative regulations, formally converted to EU laws and enforcement. The EuP directive has a significant impact on the export of Chinese household appliances. The initial calculation has brought about 50 bil-

lion RMB *yuan* loss to the Chinese household appliance industry.

The 25 European Union countries have successively implemented these three directives. In fact, they have formed the technical barriers (or it's called Green Barriers, GBs) to international trade to the vast number of developing countries, including China (Duan 2007). The green barriers made by the three orders still exist and produce a chain reaction beyond the European Union, which has a profound impact on the export of Chinese mechanical and electrical products.

Harmony Between Human and Nature

At present, mankind has entered the fastest and the most promising development stage of history. There are miraculous changes in science, technology, and management. Countless things that are regarded as dreams have become ordinary things today. It is the most important and close to the realistic work to deal with the shortcomings that still exist now and move forward to a better future.

Difficulties in Export Trade

No matter the difficulties encountered in the production or export of coke, or the challenges posed by the new EU directive, they all need to be dealt with in a scientific and rigorous manner. We cannot only see the side of green barriers, but cannot understand their rationality, which will directly impede the decision and lead to the failure to overcome the challenge. As a traditional Chinese saying goes, if you know your enemies and know yourself, you will not be imperiled in a hundred battles (Wang and Tian 2012).

Firstly, understand scientific research and test results. On December 27, 2006, the European Parliament and the EU Council of Ministers jointly issued the "Directive on the Restriction of the Sales and Use of Perfluoro Octane Sulfonate" (2006/122/EC). The directive is the 30th revision of the Council on "the Directive on Harmonization of the Laws and Regulations of the Member States Concerning the Restriction on the Sales and Use of Dangerous Substances and Products Prohibited" (76/769/EEC). The EU issued the 2006/122/EC directive, not a contingency event, but a process of scientific inspection, production practice and life consumption, and a serious legal review procedure (Peng 2017).

Perfluorooctane sulfonate (PFOS) is an organic compound with characteristics of oil repellent, hydrophobic and very stable chemical properties. It is widely used in various fields. In surface treatment, it can be applied to materials such as carpet, clothing, leather, textiles, interior decoration, and so on. In the field of paper protection, it is used for contact with food, non-food contact, etc. In addition, in the industrial cleaning agent, foam fire, petrochemical industry, surfactant, metal plating inhibiting acid fog agent, photolithography, hydraulic oil, floor polishes, shampoo, coatings, pesticides, and other products will also use the material (Zhang et al. 2017).

However, studies have shown that PFOS is one of the most difficult organic pollutants found in the world and has high bioaccumulation; high toxicity; and the capability of remote environment transmission. According to the hazard assessment results of the Organization for Economic Cooperation and Development (OECD), once PFOS is absorbed by organisms, it will mainly distribute in blood and liver, and it is difficult to decompose through the metabolism of organism. It takes 8.7 years in the half discharge time of human body. Staff from the UK Department of Environment, Food and Rural Affairs (DEFRA) sent an independent assessment of PFOS for PBT (abbreviation of "persistent, bioaccumulation and toxic"). The result is consistent with the OECD assessment and confirms that it will result in a risk of R48 (abbreviation of Risk Phrases) in toxicological studies. In other words, prolonged exposure to PFOS causes severe injury to human health (Dong 2010).

Secondly, for a deep understanding of the review of legal procedures in December 2002, OECD held the thirty-fourth joint meeting of the chemical Committee. The conference defined PFOS as a substance that persists in the environment; it has biological savings; and is harmful to human beings. According to Council of European Union (CEU) No.793/93 "Regulations on Assessment and Control to Existing Material Hazards", Britain submitted the PFOS risk assessment report and the strategy of reducing PFOS hazards and the impact assessment of the strategy to the European Commission.

The Scientific Committee on Health and Environmental Risks (SCHER) conducted a scientific review of the strategy submitted by the United Kingdom and confirmed the harmfulness of PFOS on March 18, 2005. On December 5, 2005, the Euro-

pean Commission, the only European Commission that had the right to draft decrees, proposed a motion, formulating the draft proposals and instructions for limiting the sale and use of PFOS, and evaluating the cost, benefit, balance and legality of the proposal. On October 30, 2006, the European Parliament, the lower house of the two legislative assemblies of the European Union, voted in 632 votes to 10 for the first reading of the draft. On December 12, 2006, the draft directive was finally approved by the Council of ministers. On December 27, 2006, the directive was officially announced and worked at the same time (He and Chen 2012).

Other countries have also enacted laws that strictly prohibit the use of the proportion of such compounds in products. For example, in early 2007, Environment Canada released a regulatory proposal on PFOS and its salts and certain other compounds that prohibit the production, use, sale and import of any PFOS-containing substance or product containing such substance (Except for a small amount of exemption). The proposal was adopted in 2008, and the relevant provisions were written into the "Canadian Environmental Protection Act 1999" and came into effect on May 29, 2008. Facing practical problems, and putting forward feasible solutions, is the correct way to promote the common development of environmental protection and economic construction.

Breaking through Barriers for Development

Aiming at the problems in practice, the following methods are fully feasible.

Firstly, firmly implement the national legal system. Conscientiously implement the national legal system, eliminate backward productive capacity and protect the environment. It is necessary to further implement the "*Notice the State Council on Further Strengthening to Eliminate Backward Productive Capacity (File of State Council No.7 of 2010)*". It implies exerting the fundamental role in allocation of resources by administrative means; applying the restraining function of laws and regulations and the threshold function of technical standards; eliminating the backward productive capacity of coal, steel, cement, coke, paper making and printing, and dyeing industries (Hou 2017).

Shutting down small coal mines that do not have the conditions for safe production; do not comply with industrial policies; waste resources; pollute the environment; and incorporate the completion of the target of eliminating backward productive capacity into the performance appraisal system of local governments and bringing the target completion of eliminating backward productive capacity into the performance appraisal system of local government. To strictly implement the "*Coking Industry Access Conditions (2008 revision)*"and the relevant environmental protective policies, to implement the principle of sustainable development of "total control, adjustment of structure, conservation of energy and resources, protection of the environment and rational distribution", to complete the country's elimination of the backward productive capacity of the coke industry's goal (Bai and Zhang 2017).

Secondly, strengthen the export management of environmental products. To further expand the opening to the outside and accumulate construction funds. Continue to expand exports; this is the strategic policy of China. At the same time, for the export of some products with obvious environmental factors, management must be strengthened. In limiting the export of coke, the state has repeatedly raised the coke export tariffs. In May 2004, after China abolished the export tax rebate on coke, the export tariffs were repeatedly raised from 5 percent in November 2006 to 15 percent in June 2007, 25 percent in January and 40 percent in August 2008; and has been maintained since then. Practice shows that the tariff adjustment has curbed the blind investment in some places and stopped the short-sightedness for exportation of the ecological environment of hometown for profit making. Of course, the use of economic instruments should be moderate, beneficial with restraint and avoid possible incidents such as WTO complaints, arbitration, and so on. Some overseas businessmen are greedy, taking one's undeserved gain for granted; so, we cannot let them do that (Li 2017).

Thirdly, the reform of resource tax is imperative. On January 29 2007, the Ministry of Finance and State Administration of Taxation issued document of "*Notice on the Adjustment of Applicative Coking Coal Resource Tax StandardsÿFile of finance and Taxation No.15 of 2007 ÿ*"to adjust the coking coal resource taxÿdetermining the applicable tax standard of the resource tax of coking coal which is mainly used for coking, as 8 RMB *yuan* per ton. Coking coal is listed as the first adjustment of the new resource tax, showing the scarcity of the resource in the mar-

ket. In 2010, the state began the pilot project of resource tax reform in Xinjiang Uygur Autonomous region. It collected 5 percent resource tax on the crude oil and natural gas according to the ad valorem levy (Liu and Liu 2017).

Although such reforms have not involved coal at present, the implementation of this reform is an inevitable trend, which is conducive to the formation of a pattern of complete costs and paid use of resources. However, the resource tax as an important means of adjustment of coal differential rent, the current method of collecting tax and low taxes is not conducive to improving the efficiency of resource extraction. To curb the rapid growth of coal consumption and make the coke industry better able to develop through price leverage, we need to actively promote coke futures. In this way, the exchange can try to focus on high-end coke products when making coke contracts, which will help to protect China's high-end technology and resources of coke.

Fourthly, cracking green barriers; The EU RoHS directive, which has entered into force on July 1, 2006, restricts the amount of 4 kinds of heavy metals in electronic and electrical products. The standard is very strict. The maximum limits specified in the directive are as follows: Pb < 1000mg/Kg; Hg < 1000mg/Kg; Cd < 100mg/Kg; Cr6+ < 1000mg/Kg etc. Independent assessment shows that the human body is exposed to these four heavy metals, and the health will be damaged. For example, lead can cause the central nervous system to be affected. Cadmium causes injury to bones, kidneys and respiratory system. Mercury affects central nervous system and kidney system, and the six-valence chromium causes genetic defects. Countries such as the United Kingdom, the United States, the European Union and other countries and international organizations have a long history of identifying and managing PBT chemical substances and have accumulated some experience and formed certain systems (Wang et al. 2011). We can innovate and learn from advanced methods and adopt independent assessment methods to evaluate the PBT chemical substances of domestic importance. Based on the evaluation results, we will formulate rules that are not only in line with international standards but also promote the development of domestic green products. This will effectively promote the domestic production of high-quality mechanical and electrical products and, also help to remove the green barriers (Wang and Tian 2012).

Tackling International Climate Change

In case of strengthening the forest carbon exchange transaction, there are two important measures to develop low carbon economy, save energy, reduce emission, and beautify the environment. The first is industrial emission reduction, called direct emission reduction; the second is forest carbon sequestration, which is called indirect emission reduction. According to the Seventh National Forest Resources Inventory (2004 - 2008), artificial afforestation of Chinese preservation area reached 62 million hectares, ranking first in the world; the national forest area reached 195 million hectares; the forest coverage rate increased from 13.92 percent to 20.36 percent in early 1990s, two years earlier completed, two years ahead of the 2010 forest coverage (Wang and Mao 2011).

According to the results of this survey and the monitoring results of forest ecological location, the total carbon reserves of forest vegetation in China reached 7811 million tons. The forest ecological system of water conservation volume reached 494.76 billion cubic meters; annual soil volume reached 7035 million tons; annual amount of fertilizer reached 364 million tons; annual volume absorption of atmospheric pollutants reached 32 million tons; and annual dust volume reached 5001 million tons. Only 6 functions of ecosystem services, such as carbon fixation, oxygen release, water conservation, conservation of soil, purification of atmospheric environment, accumulation of nutrients and biodiversity protection, can create wealth, with an annual value of 10 trillion and 10 billion RMB *yuan* (Jia 2009). Increasing afforestation efforts and developing forest carbon trading have far-reaching significance.

Therefore, we must continue to continue to consolidate the results of the "Outline for the Twelfth Five-year Plan for National Economic and Social Development" reviewed and approved by the Fourth Session of the 11th National People's Congress (NPC) in March 2011. The law clearly states the forest coverage, forest volume of two forest indicators as a binding indicator into the national economic and social development planning. At the same time, the State Forestry Administration made specific arrangements for the examination of two restrictive indicators in 2012 and executed in all directions (Zhang 2017). They

have become an important part of the comprehensive assessment of local governments at the national level in planting trees, protecting the environment, and benefiting the children and grandchildren.

In recent years, global warming caused by human unscientific behaviors has become increasingly apparent. According to a new report by the World Meteorological Organization, the weather of 2017 was one of the three warmest years on the record. Global warming caused a particularly substantial number of natural disasters, which total counted losses of world economy hit a record $320 billion US dollar (World Meteorological Organization 2018). The most appropriate way to reduce greenhouse gas emissions on a global scale is to participate in the UN-led international climate negotiations and actions. China has been participating in international climate negotiations and has played a positive role. In June 2007, the Chinese government first set forth a "National Plan to Address Climate Change" in developing countries. In those days, China actively and constructively participated in the UN climate change talks in Bali, Indonesia, making a substantive contribution to the formation of the Bali road map. At that conference, China made three recommendations. For example, the adherence to the provision of financial resources and technology transfer to developing countries is well implemented. These were endorsed by all the participants and eventually incorporated into the road map (He and Chen 2012).

In 2009, China actively participated in the Copenhagen conference, and announced the Implementation of the Bali Road Map - the Chinese Government's Position on the Copenhagen Climate Change Conference, put forward China's principles and goals for the Copenhagen conference. It plays a key role in breaking the deadlock of the negotiations and promoting the consensus of the parties. In 2010, China fully participated in the negotiations and consultations at the Cancun Conference in Mexico, and insisted on maintaining openness, extensive participation and consensus in the negotiation process. Prior to the Cancun Conference in the United Nations, China hosted a UN climate change conference in Tianjin city, laying the foundation for a positive outcome at Cancun. China actively participates in related international scientific and technological cooperation programs under the framework of the Earth Science System Alliance, such as the World Climate Research Program, the National Geosphere-Biosphere Program, and the National Human Dimensions Plan for Global Change, the Global Earth Observation System of Inter-Governmental Coordination, and the Global Climate System Observations Project.

The relevant research results provide a useful reference for the formulation of China's climate change policy. China has established a mechanism for dialogue and cooperation in the field of climate change with the United States, the European Union, Italy, Germany, Norway, the United Kingdom, France, Australia, Canada, Japan and other countries and regions; and signed relevant joint statements, memorandums of understanding and cooperation agreements linking climate change as an important part of the cooperation between the two parties (Geng 2017). China is actively acting to address global climate change. During the period of Twelfth Five-Year Plan (2011-2015), China's energy consumption per unit of GDP fell by 18.4 percent. The Standing Committee of the National People's Congress ratified *the Paris Agreement on Climate Change* on September 3, 2016. In the same year, national energy consumption per unit GDP fell by 5 percent (National Development and Reform Commission 2017). China earnestly fulfills its international obligations and protects the global environment.

China will continue to adhere to the two-track negotiation mechanism of the "UN Framework Convention on Climate Change" and the "Kyoto Protocol" in the future, insisting the rules of the parties dominated, open and transparent, extensive participation and consensus. We must give full play to the main channel of international negotiations on climate change within the framework of the UN and adhere to the principle of common but differentiated responsibilities. We will actively and constructively participate in the negotiation, strengthen communication and exchanges with all parties, promote consensus among all parties and achieve results for the UN climate negotiations. More pragmatic contributions are to be made in this regard (Li 2017).

The earth is the only homeland of mankind in the universe. Protecting the earth's environment is the condition for protecting the survival and development of mankind. Chinese people, from known as the Yellow River, draw on material and spiritual strength to develop modern economy and culture. For example, Henan province, which is in the middle areas of the Yellow River, has

expanded external contacts with green environmental protection as the core. In 2016, the total turnover of foreign contracted projects and labor services of Henan were 5.27 billion US dollar, an increase of 9 percent over the same period last year. The enterprises of Henan province carried out Chinese national level propose of "the Belts and Roads", and invested 600 million US dollar to have built economic and culture projects for Russia, Italy and Germany, and 760 million US dollar for Africa, etc. The projects of Henan province along the countries of "the Belts and Roads" showed distinct win-win features of the environment protection and economic benefit (Henan Provincial Commerce Department 2017). It is a good illustration of the concept of environmental anthropology. Environmental anthropology involves many aspects of research with one goal, that is, to achieve harmony between man and nature.

CONCLUSION

Innovation is the source of momentum for social progress. Innovation is also full of twists and turns. It is a fact that China's environmental pollution is serious. To solve this dilemma is to rely on innovative guidelines. The level of China's industrialization development currently belongs to the second half of the mid-industrialization period. Environmental problems are particularly prominent. Some mass-caused environmental incidents have caused serious problems. Therefore, it is of great significance to apply the game theory and so on to analyze the real problems in depth. Thinking from the perspective of competition in the international market, looking for ways to solve these problems and making an analysis of the future direction are the core concepts of this paper.

RECOMMENDATIONS

The environment protection undertaking is full of tensions in the transition and the game of interests. China's environmental situation is at a crossroads during the implementation of the Thirteenth Five-year Plan (2016-2020). Therefore, China must deal with the different objective requirements of the government, residents and enterprises or balance different tendency of interests. In the process of China's development, some economic activities have the distinctively typical significance such as the coke production, the zigzag export trade and the technical barriers of other products. China must correctly understand the three EU directives with environmental protection factors to truly deal with the harsh international challenges. China has made a lot of contributions in actively participating in the climate negotiations under the UN framework. Looking forward, there is a bright future for China's environmental protection and economic construction. China must correctly understand the harsh international challenges including the three EU directives with environmental protection factors to truly deal with foreign trade by seeking common ground and reserving differences. China has made a lot of contributions in actively participating in the climate negotiations under the UN framework. Looking forward, there is a bright future for China's environmental protection and economic construction.

ACKNOWLEDGEMENT

This study is supported by the following grants: Natural Science Foundation of Guangdong Province (China) under Project Number 2017A030307026, Guangdong Provincial Key Research Project for Universities under Project Number 2016WQNCX036, National Foundation raising project of Shantou University (NFC16002), and Scientific Research Start-up Funding Project of Shantou University (STF15003).

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Paper received for publication in January 2019
Paper accepted for publication in February 2019