

**External Motivating Factors for Greening
Small- and Medium-sized Enterprises in China**

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Abstract

Severe environmental degradation worldwide calls for imperative action from human society. Small- and Medium-sized Enterprises (SMEs), which constitute an important component in almost every economic entity in the world, are subject to growing concern, as their environmental performance is essential to regional and global environmental protection and sustainable industrial development. Due to the weakness of SMEs and the various barriers they encounter, pressure and incentives from outside are needed to engage SMEs in adopting environmental initiatives. In order to understand the current greening process of SMEs in China, this thesis identifies and evaluates several important motivating factors, their relative roles, current status and future directions in China's green business initiative.

Four factors, including the Chinese government, supply chain partners, international aid, and network & alliance, are found to be dominant in promoting the greening initiatives of Chinese SMEs. The Chinese central government regulates the environmental practice of SMEs, through creating an integrated framework of legislation and standards, which is however compromised by weak enforcement at a local level. More financial and technological support from the government is needed to improve the environmental behavior of SMEs. Through case studies, it is shown that pressure from supply chain partners can effectively push SMEs to carry out environmental management in their business practice. However, this might be limited to a small set of SMEs, and require more financial and technological cooperation across the supply chain. International aid from organizations such as the United Nations Industrial Development Organization (UNIDO) greatly promotes the dissemination of green technology and experience to Chinese industries. However, the effort is ironically currently focused on large (e.g., state-owned) enterprises due to improper government interference. Networking among Chinese enterprises, including SMEs such as China Association of Small and Medium Enterprises (CASME), plays a key role in information exchange, experience sharing and cooperation. More efforts are nonetheless needed to shift to the area of corporate environmental management.

Key words: SMEs; China; motivating factors; environmental performance

Executive Summary

Rapid industrialization around the world has caused severe environmental degradation. With attention having gradually shifted from end-of-pipe approaches to pollution-prevention strategies, there is growing interest in achieving sustainable industrial development by improving corporate environment performance. Small- and Medium-sized Enterprises (SMEs), which constitute an important component in almost every economic entity, are receiving more and more attention, because their environmental performance is essential to regional and global environmental protection.

China's economy, that of the largest developing country in the world, is dominated by SMEs, which are usually characterized as using obsolete technologies and being heavily polluting. China's serious environmental deterioration is largely attributable to the pollution caused by SMEs, despite their significant contribution to gross economic yield. Various barriers are encountered by SMEs in the process of improving their environmental performance, such as lack of financial support, lack of awareness and competence, and inertia to change. Therefore, it is necessary to have intervention and incentives from outside to better engage Chinese SMEs in adopting environmentally friendly initiatives.

The goal of this thesis is to evaluate the existing motivating factors, their relative roles, current status and future directions in China's green business initiative. Four types of motivating factors for greening Chinese SMEs were identified and investigated, including the Chinese government, supply chain partners, international aid, and network & alliance. A Swedish company (Nolato Beijing), the United Nations Industrial Development Organization (UNIDO) and the China Association of Small and Medium-Enterprises (CASME) are chosen as case studies to examine the respective roles of supply chain partners, international aid and networking in influencing Chinese SMEs' environmental performance.

The Chinese government is the major motivating factor in greening Chinese SMEs, and it also generates influence on other motivating factors, such as international aid agencies and network & alliance. The Chinese government has formulated a comprehensive legislation framework for industrial pollution control, although enforcement is relatively weak. In recent years, there is increasing evidence which shows that SMEs are receiving more and more favorable policies and financial support from the government.

SMEs in China are directly influenced by international environmental standards and certification through the supply chain. As a precondition of obtaining business contracts, environmental requirements required by customers have to be complied with by SMEs. Chinese SMEs usually have to arrange by themselves technical and financial resources to meet those requirements, with limited help from the buyer.

International aid provided by organizations such as the United Nations Industrial

Development Organization (UNIDO) usually builds upon government initiatives and strategies. The Chinese government's traditional focus on state-owned enterprises (SOEs) largely reduces the effectiveness of international cooperation projects, which initially target SMEs. However, international aid is able to improve the environmental policy context of China and the environmental awareness of industry, as well as to collect practical experiences of business environmental activities in China, among other things.

Networks and alliances of SMEs in China usually provide services to improve SMEs' competitiveness and create a better external environment for sustainable industrial development. There is low awareness of integrating environmental thinking into business practice in order to enhance SMEs' competitiveness. However, under the pressure of the government's policies, such as the *Notification of Energy Conservation and Emission Reduction in SMEs* by the National Development and Reform Commission, some networks of SMEs (for instance the China Association of Small and Medium Enterprises) are starting to help Chinese SMEs achieve energy conservation and emission reduction targets set by local government. Relevant activities include providing training and education courses, or carrying out international exchange and cooperation.

Corporate environmental activity is apparently a cross-cutting issue, especially for its implementation in SMEs. It is necessary to bring multiple stakeholders together to help SMEs integrate environmental thinking into corporate activities. The leading position of the Chinese government in influencing corporate environmental activities in China must be amplified and extended to help improve the environmental performance of SMEs. This process can be bolstered by financial and technical resources provided by international agencies and market pressure from the global supply chain. The association and networking of SMEs can function as a coordinator between SMEs and external stakeholders, and serve as a platform to facilitate information exchange and resource matching.

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1. Introduction

1.1 Green Business

The rapid increase in anthropogenic interference with nature since the industrialization era has caused severe environmental degradation around the world, which calls for awareness and imperative actions from the human society on the environmental performance of the business sector (Aragon-Correa *et al.*, 2008). It is until recently that the business sector is shifted from a contributor to environmental problems to a major actor in the ideal of sustainable development. There are increasing efforts to address the industrial development and urgent environmental challenges together aiming at creating more win-win opportunities and achieving sustainable development of the human-nature system (UNEP, 2007).

A green business or sustainable business is any organization that participates in environmentally-friendly or green activities to ensure that processes, products, and manufacturing activities adequately address the environmental concerns while maintaining a profit. It is a business that “meets the needs of the present world without compromising the ability of the future generations to meet their own needs” (Anderson, 2006). Attempt to carry out green business initiatives was initially made in large corporations through various strategies and activities, such as cleaner production, environmental management systems, sustainability reporting schemes, and corporate social responsibility (CSR), etc. However, Small- and Medium-sized Enterprises (SMEs) are becoming increasingly important in the world’s economy entities while they incur substantial environmental concerns. New efforts are therefore required to engage this group in the green business initiatives in order to achieve sustainable industrial development.

1.2 SMEs and Environment

It is well recognized that SMEs constitute an important component in the world’s economies, including both developed and developing countries. SMEs make up over 90% of business and account for 50% – 60% of employment worldwide (UNIDO, 2002). In the European Union (EU), SMEs contribute to a large part in the industrial and commercial sectors, with over 70% of the workforce located in enterprises of less than 500 employees (Greenan *et al.*, 1997). As of 2003, the vast majority (99.8%) of enterprises in Europe are SMEs, providing a significant amount of European work experience and economic activity. In the USA, more than 99% of businesses are SMEs, which provide half of the nation’s non-farm, private real gross domestic product (GDP) and half of all American’s work (United States Small Business Administration, 2008). In Canada, small firms with fewer than 100 employees make up 97% of goods-producing employer businesses and 98% of all service-producing employer businesses (Statistics Canada,

2008). SMEs are the foundation of Japanese industry by accounting for over 99% of all businesses, over 70% of all employment and providing a larger annual product value than the large-sized enterprises (Tsukahara, 2008). SMEs constitute over 97% of all private sector businesses in Australia and provide employment for 49% of the private sector workforce (Australia Bureau of Statistics, 2003). In New Zealand, 86.0% of enterprises employ five or fewer full time equivalent staff, and 98% of all enterprises can be considered as SMEs (Lawrence *et al.*, 2006).

SMEs also play an important role in the socio-economics in developing countries. Particularly, they are essential to the poverty reduction through providing a significant number of productive employment opportunities (Raynard and Forstater, 2002). In India, the small-scale industries or SMEs constitute 40% in the industrial production and 35% of the total manufactured exports, and generate approximately 14 million employments next only to agriculture (UNIDO, 2001). In South Africa, the share of employment located in the micro, small and medium sectors taken together is estimated to be more than 60%, while the sector contributes about 40% to the country's GDP (Ntsika, 2001). Vives (2005) suggest that SMEs represent over 95% of all firms in Latin America including the two major economic entities Brazil and Mexico, provide between 40% and 60% of all jobs, and account for 30% to 50% of GDP. Moreover, it is widely known that the flourishing of SMEs in developing countries is especially crucial to integrating the South into the global economy (Raynard and Forstater, 2002).

Table 1-1 The most important economic sectors with active polluting SMEs in the EU member states

Economic Sectors	Pollution
Agriculture	CH ₄ , CO ₂ , N ₂ O and NH ₃ emission
Construction, waste treatment and recycling	High emission of CFCs
Food and drink industry	O ₃ depletion, acidification, waste generation, greenhouse gases
Building products industry	Acidification, dispersion, O ₃ depletion, waste generation, greenhouse gases
Metal products industry and electro-technical industry	Halogenated compounds

Source: Ecotec, 2000

While SMEs are becoming more and more important in the global economic entities, there are growing concerns regarding the environmental impacts of SMEs around the world (Jenkins, 2009). Generally, individual SME may not have a significant environmental impact compared to large corporations, but collectively a large number of SMEs can exert considerable pressure on the environment (Lawrence *et al.*, 2006; Hussey and Eagan, 2007; Gadenne *et al.*, 2009; Jenkins, 2009). In 1997, the European Commission developed and sent out a questionnaire to all EU member states regarding the SMEs and the environment. The questionnaire results show that SMEs are an important contributor to environmental pollution, while they act as an engine for the economic growth and employment (Ecotec, 2000). Specially, replies from six EU member states, including Austria, Germany, UK, Finland, Belgium and the Netherlands, indicate that SMEs can cause a wide range of environmental pollutions in

several different economic sectors, as summarized in Table 1-1.

1.3 Corporate Environmental Activities of SMEs

In the research area of corporate environmental activities, large companies are usually taken as the norm to scale down the research results to fit SMEs (Jenkins, 2004). Many tools for developing environmental initiatives in corporations are developed for large companies and then transferred to SMEs (Lawrence *et al.*, 2006). Very limited research considers the specific situations of SMEs or design detailed implementation plans for SMEs to improve their environmental performance. This has led to a notable obstacle for SMEs to engage in environmental initiatives because managers of SMEs often have problems to find environmental tools and techniques tailored to their needs. In addition, the heterogeneous characteristics of SMEs and various definitions of SMEs in the worldwide have increased the complexity for experience and information sharing and disseminating among SMEs in different regions (Jenkins, 2009; Murillo and Lozano, 2009).

In recent years, there are emerging researches on SMEs' environmental activities, most of which were carried out in developed countries, such as UK (Revell and Rutherford, 2003; Simpson *et al.*, 2004; Jenkins, 2009), Sweden (Ammenberg and Hjelm, 2003), Italy (Ciliberti *et al.*, 2008), New Zealand (Lawrence *et al.*, 2006), and Australia (Kerr, 2006, Gadenne *et al.*, 2009), etc. Past studies have investigated the environmental awareness and performance of SMEs, as well as the obstacles and incentives for greening SMEs.

The environmental performance of SMEs may in many respects be considered as relatively poor. Most SMEs throughout the world, especially those in developing countries, do not comply with the environmental regulations (Hussey and Eagan, 2007). Very fewer SMEs carry out corporate environmental activities (Holt *et al.*, 2000; Hussey and Eagan, 2007), which are regarded as traditional initiatives of big businesses, especially multi-national companies in developed countries due to their large size and significant individual impacts (Lawrence *et al.*, 2006; Yu and Bell, 2007; Jenkins, 2009). For those enterprises with environmental activities, previous studies show that most of them are reacting to environmental issues, rather than proactively taking environmentally friendly strategies (Holt *et al.*, 2000).

The World Business Council for Sustainable Development estimated that only 5-10% of SMEs are reached by environmental outreach programs (Yap, 2006). Compared to large corporations, SMEs are usually encountered with various barriers in performing environmental practice in their businesses. SMEs are faced with great competition pressure from the market, so they have to keep their operations flexible, rapid and cheap while producing goods of a high standard (Studer *et al.*, 2008). This process takes up most of their financial, technical and human resources, which leads to a general omission of environmental activities adopted by the company. As demonstrated in past studies, obstacles for green business in SMEs include the following: lack of awareness,

insufficient financial resources, low technical capability, and inertia to change, etc (Shi *et al.*, 2008; Gadenne *et al.*, 2009; Jenkins, 2009; Murillo and Lozano, 2009).

Because of the weakness of SMEs in implementing environmental activities, there is a consensus in academia that SMEs alone are difficult to overcome those barriers or achieve corporate sustainability (Yu and Bell, 2007). The challenge is to understand how SMEs can be persuaded, encouraged or forced to undertake environmentally responsible business operations. Past studies show that the external motivating factors can influence SMEs' environmental performance and bring possible changes. Those motivating factors include government and legislation, corporate image, cost structures, competitive advantage, network and partnerships, and the influence from environmental groups and financial institutions, etc (Yu and Bell, 2007; Gadenne *et al.*, 2009; Jenkins, 2009; Rao *et al.*, 2009; Siegal and Longworth, 2009).

Compliance with environmental legislations is usually the major pressure at the very beginning, while as time goes on, community participation and market demand might become more and more important for companies to adopt environmental strategies (Zhang *et al.*, 2008). As partners, suppliers, and distributors for large enterprises, SMEs are often required to achieve various requirements set by large corporations in order to do business in the global market (Raynard and Forstater, 2002). In response to that, SMEs are challenged to improve their technical, managerial and financial skills, in which their environmental performance is also included.

SMEs are also receiving increasing attention from the international community, which could help green SMEs through significant technical and financial support. Moreover, network and alliances have been identified to be able to help overcome the various barriers encountered by SMEs to adopting environmentally friendly practices (Revell and Rutherford, 2003; Lawrence 2006).

1.4 Research Questions and Objectives

China is the largest developing country in the world with a population of 1321 million (NBSC, 2008). As shown in Figure 1-1, the rapid economic growth of China started after the reform and opening-up policy in 1978. During the past two decades, China's average gross domestic product (GDP) annual growth rate reached 9.7%, making it one of the most powerful economic entities in the world (UNIDO, 2005). As stated in a joint report by the Korean Ministry of Environment (KME) and the World Bank (WB), China's economy was characterized by rapid proliferation of SMEs, which brought strong impetus to the economic growth of China and contributed to more than half of China's gross national industrial output value (KME and WB, 2004). Among the Chinese industries, SMEs have a share of 99.3% of all registered enterprises and account for 55.6% of its GDP, 62.3% of exports, 46.2% of tax revenues and 75% of employment opportunities (Wu *et al.*, 2008).

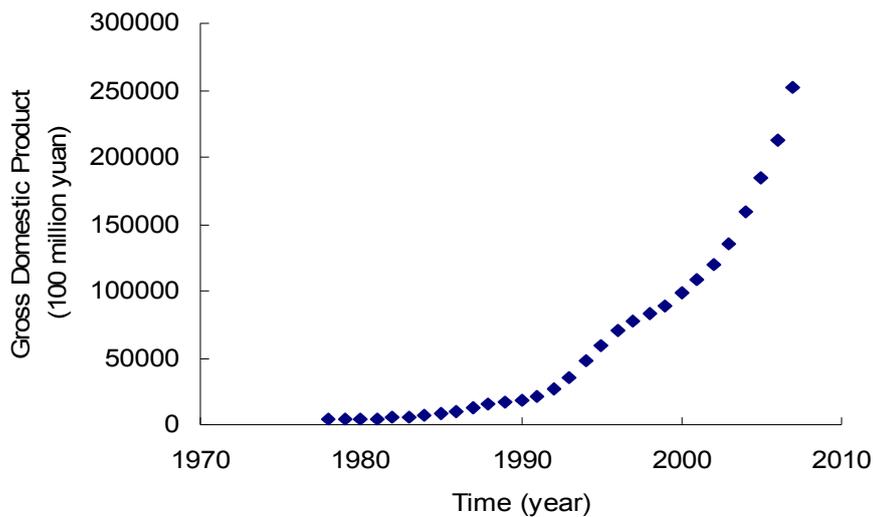


Figure 1-1 Gross Domestic Product of China (1978-2007)

Source: NBSC, 2008

However, SMEs in China have caused severe environmental problems. It is reported that about 80% of SMEs generate significant pollution in their production processes accounting for 60% of the pollution source in China and 40-50% of the country's pollution load (Niu, 2008). In 2006, only 40% of 745 water sections under the national surface water quality monitoring program met Grade I-III national surface water quality standard¹; 32% met Grade IV-V standard and the other 28% failed to meet Grade V standard. The total industrial solid waste generated in 2006 reached 1.520 billion tons, with an increased of 13.1% compared to 2005. Emissions of SO₂ to the atmosphere and organic compound to water bodies (measured as Chemical Oxygen Demand) discharges nationwide reached 25.888 and 14.282 million tons, respectively (MEP, 2006). More than 10% of the farm lands in China are suffering from heavy metal contamination, which is largely attributed to atmospheric deposition (Yap, 2006). Therefore, there is an urgent need to improve the environmental performance of Chinese SMEs.

To achieve this, it is critical to understand the internal and external factors that influence Chinese SMEs' environmental activities. The goal of this thesis is to investigate and evaluate the existing motivating factors for greening Chinese SMEs,

¹ The water quality is classified as five categories with Grade I the best of quality and Grade V the worst. Grade I standard is applied to the source water and water bodies in national natural protection areas, while Grade V standard refers to the water quality standard for agriculture sector, landscape and recreation area.

their relative roles, current status and future directions in China's green business initiative. By investigating the motivations of different facilitators and how they are behaving to influence Chinese SMEs' environmental performance, this research aims to understand the achievements and effectiveness of various driving factors. The following questions will be addressed:

- 1) What is the current environmental performance of Chinese SMEs?
- 2) What are the major motivating factors/facilitators for greening SMEs in China?
- 3) What are the relative roles and current status of these factors in the green business initiatives of Chinese SMEs?
- 4) What can be done to promote the greening of Chinese SMEs in the future?

1.5 Research Approach

This study starts by examining the current environmental status of Chinese SMEs, identifying the important motivating factors for greening SMEs through literature review, and then investigates the roles of each individual factor in influencing Chinese SMEs' environmental performance, based on a case-by-case study carried out from January to June, 2009. The data used in this thesis are from questionnaire surveys and interviews with the representative external facilitators, which are selected based on literature review, their interests in SMEs' environmental performance in China, their contributions to SMEs' environmental management, and their capability to influence SMEs' environmental behavior, as well as the availability of data and information. Table 1-2 gives information of people and organizations which have been interviewed and visited.

The questionnaire consisted of two parts. The first part was designed to get general information about the organization and the second part dealt with research questions of this thesis. A multiple-contact strategy was applied to make the respondents better understand the research topic. It included a prior phone-call or email which informed respondents about this thesis work, which was followed by a formal cover letter and the questionnaire. The questionnaire survey was also used to complement the interviews and encourage the respondents to provide more detailed information.

Both face-to-face and telephone interviews were conducted, and all the interviews were recorded and transcribed. Interviewees were those who are familiar with their organization's activities relevant to SMEs' environmental performance. Table 1-2 also shows the position of each interviewee within the organization. Face-to-face interviews were carried out in two cases including Nolato Co., Ltd and UNIDO/CNCPC, which usually lasted from one to four hours. Sometimes site visit was made in order to get complementary information and improve the confidence of the findings. Telephone interviews were made in some cases with email communications. In order to increase the validity of the information got from interviews and questionnaires, supporting documents with relevance to the thesis goal were also gathered from the interviewees.

Those documents include project documents and activity report, a list of which is presented in Appendix 1.

Table 1-2 Summary of the organizations and interviewees

Organization	Name	Occupations	Location	Means of contact
China National Cleaner Production Center (CNCPC)	Jie Yin	Director, International Cooperation Department	Beijing, China	Face to face interview
	Yanying Bai	Director, Policy and Regulatory Research Department	Beijing, China	Face to face interview
Nolato Co., Ltd	Cecilia Wang	Supplier Quality Manager	Beijing, China	Face to face interview/ Questionnaire
OPD Co., Ltd	Huntsing Liu	Marketing and sales director	Shenzhen, China	Telephone interview/ Questionnaire
Greenwood Co., Ltd	Lawrence Kwok	Marketing and sales director	Guangdong Province	Telephone interview/ Questionnaire
United Nations Industrial Development Organization (UNIDO)	Smail Alhilali	Industrial development officer, Environmental Management Branch, UNIDO (Vienna)	Vienna, Austria	Face to face interview
	Jian Ma	National project coordinator, UNIDO (Beijing Office)	Beijing, China	Face to face interview
China Association of Small- and Medium-sized Enterprises	Hui Lang	Chief	Beijing, China	Telephone interview

2. Corporate Environmental Activities of SMEs in China

2.1 Overview of SMEs in China

After the reform and opening-up policy in 1978, dual-track approach was adopted by the Chinese government to develop the market economy. Large state-owned enterprises are protected while private-owned enterprises are encouraged to flourish. On the other hand, large amount of foreign direct investment has also provided capital and managerial knowledge to local enterprises. Thus, SMEs, which used to be called as township and village enterprises, began to flourish. In later years, SMEs have made significant contributions to China's economy and society, because they are providing a large number of job opportunities which become the main destination for workers laid-off from state-owned enterprises (SOEs) that re-enter the workforce (American Embassy in China, 2002).

SMEs are defined in different ways among various industrial sectors in China. According to the *Provisional Classification Standards on the Small and Medium-Sized Enterprises* (SETC *et al.*, 2003), Chinese industrial SMEs are those enterprises which have either less than 2000 employees, or 300 million RMB annual sales, or 400 million RMB fixed assets (see *Table 2-1*).

Table 2-1 Classification of SMEs by sectors in China²

	Employee number	Annual turnover (million RMB)	Total assets (million RMB)
Industry	≤ 2000	≤ 300	≤ 400
Construction	≤ 3000	≤ 300	≤ 400
Wholesale	≤ 200	≤ 300	-
Retail	≤ 500	≤ 150	-
Transportation	≤ 3000	≤ 300	-
Post	≤ 1000	≤ 300	-
Hotel/Restaurant	≤ 800	≤ 150	-

Source: SETC et al. 2003

² Once an enterprise falls into one of the three criteria (employee number, annual turnover and total assets), it could be regarded as a SME.

Compared to the definitions of SMEs in other countries, the number of employees in Chinese SMEs tends to be much larger. For instance, the European Commission defines SMEs as an enterprise which employs fewer than 250 persons and whose annual turnover does not exceed EUR 50 million or whose annual balance-sheet total does not exceed EUR 43 million (CEC, 2003). This huge difference is attributable to China's large population and the labor-intensive characteristics of Chinese SMEs (Yuan and Bell, 2007)

Similar to many other countries, China is a nation dominated by SMEs in its industrial sectors. Table 2-2 shows the distribution of Chinese enterprises by several indicators in 2007. The number of Chinese SMEs in 2007 was 3.3 million, which accounted for 99.1% of all the enterprises, contributed to 65.2% of gross industrial output and employed 76.8% of the entire workforce. Table 2-3 shows industrial sectors in China which are predominated by SMEs. There are eleven industrial sectors in which SMEs contribute to 80% or above of its total assets.

Table 2-2 Main Statistics of Industrial Enterprises in China by size³ in 2007

Enterprise	Number of enterprises	Gross industrial output value (100 million RMB)	Total asset (100 million RMB)	Annual average number of employees (10 000 persons)
Large Enterprises	2910	140858.04	138731.15	1823.12
Medium-sized Enterprises	33596	121698.67	118284.42	2579.98
Small Enterprises	300262	142620.42	96021.81	3472.1
SMEs	333858	264319.09	214306.23	6052.08
Percentage of SMEs	99.1%	65.2%	60.7%	76.8%

Source: NBSC, 2008

In contrast to their significant contribution to the national economy, the environmental performance of SMEs in China is far from satisfactory. Most Chinese SMEs are encountered with various difficulties such as simple and obsolete technologies and equipment, untrained and unqualified labors, and insufficient financial resources. For instance, more than 70% of Chinese SMEs are still using equipment produced before 1970s (Su, 2006). In addition, Chinese SMEs usually have a strong focus on production quantity, cost reduction but not on resource efficiency. Thus, the operation and

³ Industrial enterprises above designated size are those with annual revenue from principal business over 5 million RMB.

production process of SMEs has consumed intensive energy and resources and led to severe environmental pollutions (Peng, 2001; Su 2006; Shi et al., 2008).

The SME sector in China seems to be a loophole in which heavily polluting and exploitative industries flourish and become a major contributor to China's environmental pollution, especially in those industrial sectors which are dominated by SMEs (Peng, 2001). The group of SMEs tends to be a non-point pollution source among industrial sectors, with a low individual emission, a large number of pollutant discharging units and a widespread distribution in space (Su, 2006).

Table 2-3 SMEs-dominant Industrial sectors

	Total Assets (100 million RMB)	Assets of SMEs (100 million RMB)	Ratio of SMEs' Assets to Total Assets (%)
Printing, Reproduction of Recording Media	1974	1868	95
Manufacture of Plastics	5146	4644	90
Manufacture of Metal Products	5899	5303	90
Manufacture of Articles For Culture, Education and Sport Activities	1173	1043	89
Processing of Timber, Manufacture of Wood, Bamboo, Rattan, Palm and Straw Products	1616	1437	89
Manufacture of Non-metallic Mineral Products	11937	10565	89
Manufacture of Artwork and Other Manufacturing	1665	1456	88
Manufacture of Furniture	1321	1152	87
Processing of Food from Agricultural Products & Manufacture of Foods	6924	5881	85
Manufacture of Leather, Fur, Feather and Related Products	2247	1897	84
Manufacture of Textile Wearing Apparel, Footwear and Caps	3929	3228	82

Source: ECYCSMS, 2008

Nonetheless, environmental management activities in Chinese SMEs are still at its early stage (KME and WB, 2004). Hicks and Dietmar (2007) point out that, managers in China usually consider environmental protection as end-of-pipe treatment and the application of pollution control technologies and environmental investment is merely a means to meet pollution control standards. Yu and Bell (2007) indicate that there is a high level of concern and low level of engagement of environmental initiatives by Chinese SMEs. It is also shown that this high level of concern is largely attributed to

“socially correct”. In other words, managers of Chinese SMEs tend to show a high concern of environmental issues because it is socially unacceptable not to consider environment at all. This high concern, however, is rarely translated into actions.

In addition, due to the complexity of corporate environmental strategies, Chinese SMEs are usually facing great challenges in choosing, evaluating, introducing and applying environmental initiatives (Peng, 2001). They are also incapable of operating or maintaining advanced control devices and technologies for energy saving and pollution control. Some SMEs even introduce heavily polluting and laggard technologies and equipments through foreign investment. Take the ISO14001 Environmental Management System (EMS) standard for instance. The number of enterprises which have been certified according to the ISO 14001 in China is growing exponentially and achieving 6,546 in 2004, which makes China the rank the second in Asia behind Japan (CNAB, 2004). However, the benefits of an EMS have not been well understood by SMEs, or that they may not compare favorably to the other investments SMEs may be considering. A study carried out by Yu and Bell (2007) shows that most SMEs in China still see ISO 14001 as a burden because of the prohibitive costs associated with both the implementation process but also the maintenance of the standard. They tend to pay for the cost of environmental pollution, in terms of fines and discharge fees, rather than implement the environmental management system (Yu and Bell, 2007).

2.2 Barriers to SMEs' green initiative in China

There are many barriers which obstruct the engagement of Chinese SMEs in environmental activities. A study by Yu and Bell (2007) has ranked the importance of different hindering factors through questionnaire survey and interview with 300 SMEs in China (see Figure 2-1).

Lack of financial support

Both the initial setup cost and the future running cost of environmental to maintain the environmental activities are of great concern to SMEs. Lacking of financial support is one of the most important barriers which prevents Chinese SMEs from considering corporate environmental activities (Yu and Bell, 2007; Shi *et al.*, 2008). Low returns and longer gestation periods of environmental strategies have also aggravated SMEs' reluctance in becoming green business (Shi *et al.*, 2008). On the other hand, the vicious circle of fund and poor credit records of Chinese SMEs make it much more difficult for them to obtain a loan from commercial banks, compared to larger companies such as the state-owned enterprises (Yu and Bell, 2007). In 2004, SMEs generated more than half of Chinese GDP but only received 10% of all bank loans, while state-owned enterprises which contributed to 17% of Chinese GDP received more than half (Wu *et al.*, 2008). There is also a lack of financing service institute in China, and most of them have the preference to serve big companies

rather than SMEs (Shi *et al.*, 2008).

Although China's credit guarantee system was created in the late 1990s and the risk investment fund for SMEs implementing environmentally friendly practice is emerging, few SMEs successfully accessed these funds (Yu and Bell 2007). An investigation done by the American Embassy in China (2002) shows that less than 1% of China's SMEs are qualified to apply for a guarantee according to government's criteria.

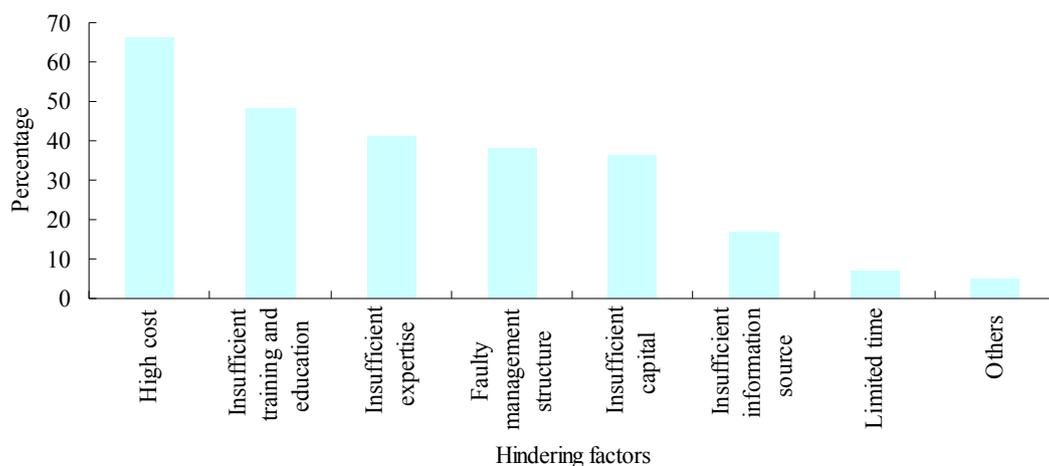


Figure 2-1 Hindering factors to implementing environmental practice in SMEs in China

Source: Adapted from Yu and Bell, 2007

Lack of awareness

It is widely known that SMEs are usually lacking in environmental awareness and not capable of integrating environmental thinking into their operation. The same problem exists in China. Many SMEs' managers consider their environmental impacts are very small or even do not exist, and most of them do not have a concrete perception of corporate social responsibility or other environmental management standards (Yu and Bell, 2007). Senior managers in SMEs are usually not able to perceive the potential benefits and advantages that they could get from environmental activities and sustainable issues are regarded to be nothing but a cost or a threat to the company (Peng, 2001, Yu and Bell, 2007, Shi *et al.*, 2008). There is also a lack of knowledge of existing environmental regulations among Chinese SMEs (Peng, 2001, Yu and Bell, 2007).

Lack of competence

Managers of SMEs are usually lacking in basic managerial and technical capability to

implement environmental activities (Shi *et al.*, 2008). Besides, the infrastructure and devices for environmental monitoring and implementation are also insufficient in SMEs (Peng, 2001). It is also hard for SMEs in China to attract capable technical staff to implement environmental activities because most of them are labor-intensive manufactures with low profit and unsatisfactory working conditions (Peng, 2001).

Inertia to change

As pointed out by Jenkins (2004) that the main risk for SMEs is the failure to survive, SMEs will only consider change when convinced that it will not generate negative impacts on its business. Normally the adoption of environmental activities needs to adjust the production process which might bring huge impacts on the daily operation of a company. For SMEs, they don't have enough financial or technical resources to support this process, and they are very vulnerable and sensitive to the production changes. Therefore, SMEs usually see taking environmentally sound actions as an operational and financial risk (Jenkins 2004). Many SMEs even doubt that investment in environmental sound practices in their companies would bring benefits to their business (Gadenne *et al.* 2009).

The pursuing of short-term business profits and reluctance in innovation has become a huge obstacle for SMEs to implement environmentally friendly actions. SMEs are much more skeptical and more reluctant to use new environmentally friendly methods than large companies, unless those methods have been demonstrated very successfully in other similar enterprises.

3. Motivating Factors for Greening SMEs in China

Based on literature review and availability of information, this work has selected four external motivating factors to investigate their influence on SMEs' environmental performance in China, including legislation and government, supply chain partners, foreign aid resources and network and alliance.

3.1 Chinese Government

In the past two decades, Chinese government was very active in designing resource saving and pollution prevention strategies (UNIDO, 1998). Many environmental legislations have been formulated, most of which are targeting industrial pollution control through end-of-pipe solutions. However, emphasis has been shifted to industrial pollution prevention in recent years.

Chinese government traditionally put more efforts on state-owned enterprises, but now supports are gradually extended to other types of firms, including SMEs. The most significant sign for this change is the establishment of a SME agency in the central government which institutionalizes a framework of supports to SMEs and the release of SME promotion law in 2002 which set guidance and standards for the governmental supports to SMEs.

This section will introduce China's legislative framework, institutional context and economic incentive for improving SMEs' environmental performance.

3.1.1 Policy Response

Chinese environmental legislations before the 21st century

Since the first law addressing water pollution came into force in 1984, Chinese legislative system began to form a comprehensive set of laws and regulations on environmental protection (See Table 3-1). The early Chinese environmental legislations mainly focused on environmental standard formulation, pollution control and the treatment of wastes. Limited attention is put on incorporating environmentally friendly activities into corporate operations. Besides, due to the weak enforcement of those legislations, the severe environmental pollution generated by Chinese industrial sectors has not been properly solved.

One of the most important principles to address industrial pollution in China is "the polluter-pays-principle" (Mol and Liu, 2008), which was first introduced in the *Environmental Protection Law* and then the *Law of the People's Republic of China on Prevention and Control of Water Pollution*, as presented below.

Table 3-1 Chinese environmental legislations before the 21st century

Name	Enforcement Date	Articles related to industrial pollution prevention
Law on the prevention and control of water pollution	1984-05-11	Article 22 Enterprises shall adopt <i>cleaner production</i> techniques which are efficient in the use of raw materials and discharge small quantity of pollutants, and shall strengthen the management to reduce the water pollutants generated.
Environmental protection law	1989-12-26	Article 25 For the technological transformation of newly built industrial enterprises and existing industrial enterprises, facilities and processes that effect a high rate of the utilization of resources and a low rate of the discharge of pollutants shall be used, along with economical and rational technology for the comprehensive utilization of waste materials and the treatment of pollutants.
China's Agenda 21	1994-03-25	Article 2.18(e) <i>Cleaner production</i> will be given a high priority in China's sustainable development
Law on the prevention and control of atmospheric pollution	1995-08-29	Article 19 Enterprises shall give priority to the adoption of <i>cleaner production</i> techniques that are instrumental to high efficient use of energy and to reducing the discharge of pollutants so as to decrease the generation of atmospheric pollutants.
Law on the prevention and control of environmental pollution by solid waste	1995-10-30	Article 4 The state shall encourage and support <i>cleaner production</i> to reduce the creation of solid waste.
Law on prevention and control of pollution from environmental noise	1996-10-29	Chapter III: prevention and control of industrial noise pollution

Environmental Protection Law (NPC 1989): “Article 28. Enterprises and institutions discharging pollutants in excess of the prescribed national or local discharge standards shall pay a fee for excessive discharge according to state provisions and shall assume responsibility for eliminating and controlling the pollution. The provisions of the Law on Prevention and Control of Water Pollution shall be complied with where they are applicable. The income derived from the fee levied for the excessive discharge of pollutants must be used for the prevention and control of pollution and shall not be appropriated for other purposes. The specific measures thereof shall be prescribed by the State Council.”

Law of the P.R. China on Prevention and Control of Water Pollution (NPC 1984): “Article 15. Enterprises and institutions discharging pollutants into a water body shall pay a discharge fee as provided for by the state. If the discharge of pollutants exceeds the limits set by national or local standards, they shall pay a fee for excess

discharge according to state provisions. The income derived from the discharge fee and the fee for excess discharge must be used for the prevention and control of pollution and shall not be appropriated for other purposes.

Enterprises and institutions discharging pollutants in excess of the prescribed standards must work out a programme to eliminate and control the pollution, and report such programme to the environmental protection department of the local People's government at or above the county level for the record."

Nonetheless, the current discharge fee is only 50% or even less of the operating cost of pollution treatment facilities, which leads to a low level of pollution treatment among industries (Zhang, 2008). Many enterprises, mostly SMEs, prefer to pay for the discharge fee rather than run pollution treatment facilities, due to the lack of financial and technical capabilities. The weakness of the polluter-pays principle has left severe environmental pollution unsolved in China.

In order to promote the pollution control in the entire country, the State Council released an act of "*Decisions on Several Environmental Protection Issues*" in August, 1996. Following that, more than 150,000 small and heavily polluting enterprises have been closed, suspended, merged or transformed by the Chinese government (Shi *et al.*, 2008). Most of those small companies were electro-plating, pulp and paper making, chemical and coal industries with the following characteristics: obsolete production technologies, low resource-use efficiency, poor product quality and intensive environmental impacts. This act has generated great pressure on SMEs, as they need to improve their environmental behavior to survive. However, this measure did not bring fundamental changes to the environmental performance of SMEs (Shi *et al.*, 2008).

Chinese environmental strategies in the new century

In order to balance the rapid economic growth and severe environmental pollution and to achieve the socialist ecological civilization, the Chinese government proposed a scientific, people-centered and sustainable model of growth for the new century in the Third Plenary Session of the Sixteenth Central Committee of the Chinese Communist Party in 2003. The *11th-Five Year Plan for National Economic and Social Development of People's Republic of China (2006-2010)* identified several environmental objectives related to industries, as follows:

- 1) Energy consumption per GDP decrease by 20%;
- 2) Water consumption per industrial added value decrease by 30%;
- 3) Total emissions of main pollutants (sulphur dioxide and COD) decrease by 10%;
- 4) Comprehensive utilization of industrial solid wastes increase from 55.8 to 60% (CPG, 2006)

There is also an entire section (Section Six) in the 11th-Five Year Plan specifically addressing the idea of constructing a society of resource economization and environmental friendship. This section especially highlights the importance of circular

economy, resource efficiency and management, and environmental protection (CPG, 2006). The development of circular economy is one of the most important tools to achieve energy saving and emission reduction of the whole country, which hence is placed in the central agenda of the Chinese government, as appeared in the “*Opinions on Accelerating the Development of Circular Economy*” (SC, 2005).

By looking into the basic environmental strategies and objectives of the Chinese government, it can be seen that nowadays improving the environmental performance of industrial sectors has been regarded critical to control the environmental pollution in China. The Chinese government wants to push forward the environmental protection through promoting more sustainable industrial development instead of merely focusing on end-of-pipe approaches. In response to that, several legislations targeting industrial pollution prevention have been formulated, such as the *Cleaner Production Promotion Law* and the *Circular Economy Promotion Law*.

Chinese environmental legislations in the 21st century

a). Cleaner Production Promotion Law

The *Cleaner Production Promotion Law* was approved on June 28th, 2002 and came into force on January 1st, 2003. It is one of the first legislations in the developing world focusing on promoting environmentally sound activities in industries (Shi *et al.*, 2008). The *Cleaner Production Promotion Law* provides detailed regulations of cleaner production promotion and application for industrial sectors. Although it is a promotion law, there are still some mandatory regulations for enterprises, for example, compulsory reuse of certain products and compulsory labeling of certain products or packages. Heavily polluting enterprises are required to conduct cleaner production auditing and to regularly report on emissions (NPC, 2002a).

In article 34 of Chapter IV “Inducement Measures”, it clearly states that “Funding from the Small- and Medium-Sized Enterprise Development Fund (founded under the *Law on Small and Medium-sized Enterprises*) established in accordance with national regulations shall be set aside to support cleaner production of SMEs to meet their needs” (NPC, 2002a). SMEs which implement cleaner production or conduct a cleaner production audit are eligible for low-interest or non-interest loans from this foundation administrative agency. In article 24 of the *Interim Regulations of Cleaner Production Audit* which came into force on October 1st, 2004, it reinforces again that as one of its aims the Small- and Medium-Sized Enterprise Development Fund should be used to support the cleaner production implementation in SMEs (MEP, 2004).

b). Energy Conservation Law

The *Energy Conservation Law* came into force on April 1st, 2008, which aims to promote energy conservation and improve energy efficiency in China. In article 7, it states that Chinese government will develop policies to facilitate energy conservation and

environmental protection, to limit the development of massive energy consuming and heavily polluting sectors, and to develop environmentally friendly sectors (NPC, 2007). Under the guidance of this law (article 13 and 16), the national energy conservation standards, sectorial energy conservation standards and the catalogue of energy-guzzling products and equipment to be phased out shall be developed by the department of energy conservation administration under the State Council. It specifically addresses energy conservation in industrial sectors. For example, policies for energy conservation technology promotion will be formulated for major energy consuming industrial sectors such as chemical and petrochemical industries (article 30). The State also encourages industries to utilize equipment of high energy efficiency and improve the energy-consumption monitoring device and technologies, etc (article 31).

c). Circular Economy Promotion Law

The *Circular Economy Promotion Law* came into force on January 1st, 2009. The aim of the *Circular Economy Promotion Law* is to boost sustainable development through energy saving and reduction of pollutant discharges. The Circular Economy Promotion Law has identified sectors which must play a major role in the process. To achieve a more Circular Economy, profound change in all six sectors is required, since all are major consumers of resources with responsibility for resource recovery as well as efficient first use.

- **Heavy and light industry**, ranging from small to medium enterprises to large scale extraction and production facilities;
- **Urban planning**, including transportation infrastructure and open space for ecological services, etc;
- **Municipal infrastructure** for energy, water, discarded materials, transportation and communications;
- Planning, construction and management of **the built environment**;
- **Agriculture**, food processing, and agribusiness suppliers;
- **Households**, where critical choices are made impacting resource utilization and resource recovery, such as electrical appliances.

d). Small-and Medium-sized Enterprise Promotion Law

The Small-and Medium-sized Enterprise Promotion Law was approved on June 29th, 2002 and came into force on January 1st, 2003. It aims to promote the development of SMEs in a sound way by clarifying what types of government financial support would be available to SMEs. In its second section “financial support”, several articles elaborate the establishment of Fund for the Development of Small-and Medium-sized Enterprises and define the areas where the fund could be used, one of which is supporting cleaner production implementation and technical innovation in SMEs (NPC, 2002b).

Most articles of the law are suggestive and local governments are expected to provide detailed implementation plans.

e). Cleaner Production Standards

Currently there are 44 cleaner production standards available for different industrial sectors in China (See Appendix 3). Each standard consists three categories of cleaner production technology: international advanced cleaner production technology, national advanced cleaner production technology and national average cleaner production technology. Cleaner production criteria which are considered in the standard include production process and equipment requirement, resource utilization, product, pollutant generation (before end-of-pipe treatment), waste recycle and reuse and environmental management. Benchmark is set for each cleaner production criteria in each technology category.

f). Notification of Energy Conservation and Emission Reduction in Chinese Small- and Medium-sized Enterprises

In order to achieve the energy conservation and emission reduction target set by the Chinese government, National Development and Reform Commission released the *Notification of Energy Conservation and Emission Reduction in Chinese Small- and Medium-sized Enterprises*. Indicators such as SMEs' energy consumption per GDP, water consumption per industrial added value and total emissions of main pollutants are required to achieve the national average in a long term (NDRC, 2007).

To achieve this goal, the notification identifies several means, including enhancing SMEs' awareness of energy conservation and emission reduction, phasing out obsolete technologies and equipment in SMEs, developing and promoting advanced technologies for energy conservation and emission reduction, promoting circular economy and environmental industries, exploring centralized pollution control methods for SMEs and improving managerial competence of SMEs (NDRC, 2007).

3.1.2 Institutional Context

SMEs used to be under the supervision of the Department of SMEs in State Economic and Trade Commission (SETC). Administration of SMEs is transferred from the NDRC to the newly established Ministry of Industry and Information Technology (MIIT) in 2008 (GOSC, 2008).

The department of SMEs in MIIT provides guidance to the development of Chinese SMEs in macro level, and designs policies and measures with other government sectors to facilitate the development of SMEs and non-state economy (GOSC, 2008). MIIT works closely to formulate policies on energy conservation, resource comprehensive utilization, cleaner production promotion and pollution control in industries and communication sector, and to develop plans for energy conservation,

resource comprehensive utilization and cleaner production promotion (GOSC, 2008).

In MIIT, much attention is paid to the competitiveness and capacity building of SMEs, while there is very limited awareness of raising SMEs' competitiveness by integrating environmental thinking inside the MIIT.

At the local level, SMEs are usually under the supervision of either local economic and trade commission or provincial SMEs bureau. The main task of these government sectors is to implement the *SMEs Promotion Law*.

Currently, there is no specific government sector responsible for promoting corporate environmental activities in industries in China. However, the department of pollution control in the Ministry of Environmental Protection has put industrial pollution prevention and control as one of its main tasks. Its working areas include industrial structure adjustment, cleaner production audit for key enterprises, and environmental protection audit for companies listed on stock market (MEP, 2009). After the promulgation of the *Cleaner Production Promotion Law*, the cleaner production audit and implementation has been mandatorily forced on to the business agenda of key enterprises, whose pollutant discharge exceeds national or local standards or total volume of pollutant discharge surpasses standards stipulated by the local government, or who use toxic raw material in production or discharge toxic and hazardous materials during production (NDRC and SEPA, 2004).

3.1.3 Economic Incentive

Fund for the Development of Small-and Medium-sized Enterprises

In accordance with the *SMEs Promotion Law*, Fund for the Development of Small-and Medium-sized Enterprises was founded in 2004 with the aims to support the specialized development, structure adjustment and upgrading of SMEs, to help SMEs cooperate with large enterprises, to improve technologies, to build brand and to strengthen credit guarantee system for SMEs (MF and MIIT, 2008).

Originally, this fund was administrated by the National Development and Reform Commission (MF and NDRC, 2006). After the restructure of Chinese central government in 2008, the newly-founded Ministry of Industry and Information Technology (MIIT) takes the responsibility of determining supporting areas and focal points of the fund. MIIT is also responsible for reviewing applied projects and supervising projects' implementation together with the Ministry of Finance (MF and MIIT, 2008). The main responsibilities of Ministry of Finance are budget management, project fund allocation and supervision over the whole process of fund utilization (MF and MIIT, 2008).

The development fund takes the modalities of financial appropriation, loan interest subsidiary and equity investment. The applicant enterprise can choose only one type

out of three. Through financial appropriation, project fund is usually under three million RMB; while the maximum subsidized interest for each project would be less than three million RMB within a time frame of less than two years (MF and MIIT, 2008).

According to the *Measures for Administration of Special Fund for the Development of Small-and Medium-sized Enterprises*, qualified SME-applicant has to have independent legal status, healthy financial management system, sound economic profit, good accounting, tax-paying and bank credit. And the applied project has to be in accordance with certain annual supporting area and focal point of the development fund (MF and MIIT, 2008).

Financial government sector and SMEs administrative sector at provincial level are responsible for project application and review. Technical, financial and marketing experts would be gathered to evaluate the applications, the results of which have to be submitted to the Ministry of Finance and Ministry of Industry and Information Technology for final decisions.

By the end of 2008, the central government of China has raised 3.9 billion RMB (around 0.39 billion Euro) for this fund.

3.2 Supply Chain Partner

Many studies pointed out that, pressure from supply chain partners, especially customers, in developed countries has become a main driver for SMEs to adopt corporate environmental activities (Ciliberti *et al.*, 2008; Zhang *et al.*, 2008; Gadenne *et al.*, 2009). Usually a SME is financially linked with a large customer company which requires the suppliers to implement environmental management to improve their environmental performance (Jenkins, 2004). Thus, supply chain pressure from the large enterprises may effectively promote the greening of SMEs, which in turn improves the companies' competitiveness, especially in the international market (Gadenne *et al.*, 2009). Similarly, any SME across the supply chain can exert the pressure on its up-stream suppliers and directly or indirectly influence the environmental practices of other SMEs.

Various means have been taken by up-stream companies in supply chains, such as establishing written supplier requirements, monitoring and auditing supplier performance to verify compliance with the requirements and contribute to suppliers' environmental awareness building (Ciliberti *et al.*, 2008). Managers of companies in developed countries are encouraged to develop some initiatives to transfer environmental protection practices to their suppliers in developing countries, such as promoting visits of suppliers to the SMEs plants or showing them environmental best practices adopted by other companies (Ciliberti *et al.*, 2008). However, the competition to be suppliers might be severe and it may reduce the opportunity of direct guidance to suppliers from the up-stream greener companies.

To understand how the environmental performance of SMEs in China is influenced by their supplier chain partners, this research selected Nolato (Beijing), a Swedish company in the telecommunication sector as a case study. In order to verify and follow up with the information obtained from Nolato (Beijing), its two SME-suppliers were contacted and interviewed.

Case study: Nolato (Beijing)

Located in Beijing, China, Nolato Mobile Communication Polymers (Beijing) Co., Ltd, or Nolato is an intermediate supplier providing advanced mechanical modules, product system development and manufacturing based on various polymer materials. Its main customers are large companies in the area of telecommunication, such as RIM and Ericson. The major manufacturing processes in its factory include molding, painting, printing, vacuum metallization, flat window and assembly. Nolato was certified according to ISO 14001 on May 28th, 2002. Among its 2475 full time employees, there are 17 qualified environmental auditors at the site. Currently internal environmental audits are carried out twice every year and external environmental audits are carried out once every year by the certification body of ISO 14001.

In bill of material, Nolato currently have 79 suppliers, 83% of which are SMEs. OPD and Greenwood are two of them. OPD comprises OPD Technology (Shenzhen) Co., Ltd and OPD Metal Product (Shenzhen) Co., Ltd. It is foreign financed (Hong Kong) and has 400 employees and 11000 m² factory area in Shenzhen, Guangdong Province. Its main products include metal mobile phone covers and components, metal components for audio video equipments, and metal components for digital media products etc. OPD became a supplier of Nolato in 2004, and got certified according to ISO 14001 in 2005. Established in 1979, Greenwood Co., Ltd. is a medium enterprise in telecommunication sector, with a fixed asset of HKD 300 million. It has certified according to ISO 14001.

As an intermediate supplier, Nolato receives environmental requirements from its customers, for instance, on implementing an environmental management system and providing environmental product declarations or other environmental requirements for products. Its customers follow up their requirements by site visits or audits. The environmental requirements of Nolato, which are usually adapted from its customers, have to be achieved by Nolato's suppliers. Nolato also requires its supplier to pass and request its secondary suppliers to meet the environmental requirements.

Nolato's supplier evaluation form (See Appendix 4) shows that the criterion of "Environment" accounts for 140 points out of 730 in total, while "Quality" and "Technical competence" account for 150 and 110 respectively. "Environment" ranks the second place among all the 8 criteria, including "Quality", "Environment" "Technical competence", "Finance and trade", "Personnel", "Purchasing and logistics", "Management and organization" and "Production facilities". Therefore, "environmental performance" is Nolato's second important selecting criteria of

suppliers, with “quality” ranking the first. Nolato’s potential suppliers thus need to pay special attention to their environmental behavior and get high points in the environmental section in order to get contracts from Nolato. To take Greenwood for example, in order to cooperate with Nolato, it established a new management system of special liquid.

Nolato requires its short listed suppliers to sign the Environment Friendly Declaration. If there is a suspicion that the ordered parts are restricted, toxic or hazardous, the supplier has to provide a warrant or certificate that the parts comply with governmental and safety regulations with regards to packaging, labeling, storage and handling instruction, first aid, etc. After becoming suppliers of Nolato, companies are required to achieve continuous improvement in their environmental performance. To do so, environmental management system has to be established. Besides, Nolato carries out environmental audits to urge suppliers to take correct environmental actions. For instance, after cooperating with Nolato, OPD improved its environmental performance and 5S through Nolato’s supplier environment quality system audit, especially on waste minimization and handling.

Nolato also pays close attention to its suppliers’ environmental performance in the research and development process of new products, aiming to control a product’s environmental impacts in its life-cycle. Usually a project is set up by Nolato and its supplier together (sometimes with the participation of Nolato’s customers) to carry out new product design and manufacture.

As one of Nolato’s SME-suppliers, OPD invests 0.15% of its annual sale in improving its environmental performance, including noise control, water pollution, hazardous waste treatment and energy and resource conservation, etc. Pressure from its customers and government environmental requirements are the main reason for OPD’s environmental investment. For example, OPD improved its environmental performance in order to become Samsung Eco partner (August 2007) and Canon Eco partner (December 2007). OPD also controls the noise pollution in its production process in order to meet the strict standards of noise pollution formulated by Shenzhen municipal government.

OPD receives benefits in its business by improving its environmental performance, which provides the motivation for OPD to continue on its environmental practice. However, cost for adopting environmental initiatives is an important factor which could influence the company’s decision of environmental investment. Economic profit is always the first priority of a commercial company. Hence, environmental investment has to be limited to certain amount which does not conflict with the company’s profit.

OPD does not think its customers help improve its environmental performance. Usually OPD is only provided with some environmental protection standards or requirements, such as Restriction of Hazardous Substances (ROHS) Banned substance list, with which it is required to meet.

Greenwood's environmental requirements fall into two categories: for products and for the manufacturing process. Customers are mainly concerned with the environmental impacts of products rather than environmental pollution in the manufacturing process. It is not difficult for Greenwood to meet customers' product environmental requirements with low investment. The majority of the investment is to fulfill Chinese government's environmental regulation, from which Greenwood does not see any profit return. The interview with Greenwood shows that government regulation is the major pressure for the company to improve its environmental behavior, and the company is very reluctant to fulfill the environmental regulations.

Limited technical and financial assistance is provided to Greenwood by its customers to address its environmental performance. In the interview, Greenwood indicated that it is very difficult for customers to provide useful help because customers have limited knowledge of the whole manufacturing process of the products they use.

The different environmental requirements of its customers do not become a burden for Greenwood because it can find ways to compromise among different requirements. Greenwood still shows a positive attitude on improving its environmental behavior in the future. It thinks that good control on environmental activities is a necessity for the company because people all around are getting more and more environmental conscious.

3.3 International Aid

Corporate environmental initiatives in industrialized or developed countries have been developed since the 1980s, and the experiences demonstrate that environmentally sound activities could bring a company both economic and environmental benefits. There is an urgent need to introduce and disseminate the environmental technologies and ideologies to enterprises in developing countries, given that nowadays many developing countries are experiencing rapid growth and making major investments in capital equipment (UNIDO, 1998). A delayed transferring and application of environmentally sound activities in corporations of developing countries is very likely to aggravate the environmental pollution and incur high costs for pollution control. This concern, therefore, generate great motivations and opportunities for international cooperation and investment. External stakeholders, including foreign governments, international organizations and institutions with rich experiences and information about corporate environmental behavior, have both the financial and technical capabilities to help promote the green business initiatives in developing countries. Various types of measures have been provided by international institutions, such as soft loans, grants, and technical assistance, etc (Akihisa, 2008).

Table 3-2 International cooperation projects related to industrial environmental performance in China

Project Title	Duration
Sino-Norway Cleaner Production Promotion Project	1993-1995
World bank Technical Assistant project: Project of promoting China's cleaner production	1993-1996
World Bank Project "The popularization of international Pollution Prevention Technologies in China"	1995-1997
UNIDO/UNEP National Cleaner Production Centres (NCPCs) Program	1995-1998
Sino - Netherland pilot project of small and medium sized enterprise cleaner production audit	1999-2001
Asian Development Bank Promotion of Clean Technologies	1999- 2004
UNIDO/Swiss Government- Environmentally Sound Technologies Programme in China	2002- 2007
World Bank & Ministry of Environment of Korea - the Environmental Management Partnership Program (EMPP)- Environmental Management of SME and Industrial Zones project implemented in China	2003-2005

Source: China National Cleaner Production Centre www.cncpn.org.cn/index.asp

Ministry of Environment of Korea www.eng.me.go.kr

As the largest developing country in the world, China attracts great attention from external parties. The international communities widely recognize that they could benefit from assisting China's pursuit of a more environmentally friendly development strategy (Yap, 2006). For instance, cleaner production activities was first introduced and developed in China through the World Bank subproject B-4 in 1993. Since then, many demonstration projects concerning corporate environmental initiatives have been carried out, with financial and technical support from various donors including the World Bank, United Nations Environmental Program (UNEP), United Nations Industrial Development Organization (UNIDO), the Netherlands and Sweden, etc (See Table 3-2).

Case study: United Nation Industrial Development Organization (UNIDO)

The United Nations play a very important role in facilitating the engagement of local SMEs with environmentally and socially responsible business practices (Raynard and Forstater, 2002). Through multi-stakeholder partnerships promoted by framework initiatives, such as the UN Global Compact and its individual organizations (e.g., UNIDO), UN is working towards the promotion of economic prosperity while improving social and environmental performance of business (Raynard and Forstater, 2002). In this thesis, UNIDO, the specific branch of UN with worldwide experience and internationally recognized expertise on sustainable development of SMEs, is selected to investigate the role of international aid in the process of greening SMEs in China.

As a part of the United Nation system, UNIDO is founded in 1966 and became a specialized agency in 1985. Its primary objective is the promotion and acceleration of

industrial development in developing countries and countries with economies in transition by offering solutions for the internationally competitive and environmentally sustainable industry. Given the importance of SMEs in the socio-economics of developing countries, UNIDO has been at the forefront of promoting poverty reduction and the sustainable industrial development of SMEs.

Various types of services have been provided by UNIDO to promote the sustainable development of SMEs worldwide. There are around 60 accomplished projects which directly target SMEs in developing countries and countries with economies in transition. UNIDO mainly helps SMEs access opportunities through information and communication technology, brings experience to SMEs to enhance their competitiveness and promote SME exports by supporting the creation of export consortiums⁴, etc.

In order to achieve the environmental target of the Millennium Development Goals, such as Goal 7: “ensure environmental sustainability” and its Target 9: “integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources”, UNIDO has put energy and environment as one of its inter-related thematic priorities. Therefore, environmental issues related to industrial development have been linked very closely to UNIDO’s objective of productivity enhancement.

Under the guidance of its two priorities: SMEs and industry-related environmental issues, UNIDO has made great efforts on improving SMEs’ environmental performance. Many demonstration projects for cleaner production with special focus on SMEs’ environmental performance have been carried out. Table 3-3 shows a list of projects on the competitiveness and sustainability of SMEs.

⁴ See <http://www.unido.org/index.php?id=5391>

Table 3-3 UNIDO Projects focused on sustainable development of SMEs

Project	Country	Duration
Integrated industrial development programme for capacity building to enhance industrial competitiveness and sustainability in Tanzania (with emphasis on SMEs and Agro-industries)	United Republic of Tanzania	1999-2002
National programme to support energy efficiency and quality standards in ceramics small and medium scale enterprises (SMEs)	India	2005-2008
Helping Vietnamese SMEs adapt & adopt CSR for improved linkages with global supply chains in sustainable production	Vietnam	2009-2012
Technical assistance to SMEs to access the market of sustainable public procurement through cleaner production	Colombia	2009-2012
Harnessing sustainable linkages for SMEs in Turkey's textile sector	Turkey	Pipeline project
Strengthening Thai SMEs for sustainable food production	Thailand	Pipeline project

A significant joint effort of UNIDO to address SMEs and corporate environmental activities is the UNIDO/UNEP network of national cleaner production centers in developing countries and countries in transition (UNID-UNEP Cleaner Production Programme) started from 1994. It mainly focuses on supporting cleaner production efforts of SMEs in various industrial sectors (Raynard and Forstater, 2002). The establishment of China National Cleaner Production Centre (CNCPC) was part of the effort.

CNCPC was founded in December 1994 under the former State Environmental Protection Administration. CNCPC received institutional funding support through the UNIDO-UNEP Cleaner Production Programme from 1995 to 1998. During recent years, CNCPC has carried out many demonstration projects at different industrial sectors in cooperation with international agencies or other government sectors. There was one project named "Sino - Netherland Pilot Project of Small and Medium Sized Enterprise Cleaner Production Audit" with a focus on SMEs' in China. This cooperation aimed at improving the production processes and technologies of SMEs, and providing necessary cleaner production audits to SMEs. During this project, many SMEs were contacted but most of them were reluctant to participate in the cleaner production program.

Most of the on-going projects in CNCPC are carried out with large enterprises, especially the state-owned enterprises. Cooperating partners are chosen from the companies which are proved to be financially sound and have strong technical capacity.

Because of its program strategy, UNIDO stopped supporting the CNCPC both

technically and financially. The CNCPC gradually becomes a public institute receiving funds from the Chinese Research Academy of Environmental Sciences, which is under the supervision of the Ministry of Environmental Protection. Currently, CNCPC is a dominant institute for promoting and implementing cleaner production in China. Its major duties include providing cleaner production auditor training services, carrying out mandatory cleaner production audit and researches on cleaner production technologies and methodologies, formulating cleaner production policies and cooperation with international agencies. Its main focus is put on the mandatory cleaner production audit in key enterprises in order to implement the *Cleaner Production Promotion Law*.

For UNIDO, its strategy of international cooperation is to look for appropriate government initiative which suit UNIDO's project objectives, and then put into efforts and aids to facilitate this government initiative. It hardly builds its own projects independently without establishing any focal point with local government or organizations.

It is worth mentioning that, it is not UNIDO but its counterpart in China, usually local EPBs and government, who are in charge of selecting cooperating companies to carry out demonstration projects. In most cases, large companies with either several thousand employees or advanced equipments are selected. Such preference is usually given to state-owned enterprises. Although sometimes the original focus of the demonstration projects is on SMEs, for instance the Environmentally Sound Technologies Programme in China, large companies with sound financial performance are chosen because they are more likely to gain good results based on the project, and be able to pay back loans (UNIDO, 2005).

UNIDO's aim on promoting cleaner production in China with a specific focus on improving SMEs' environmental performance has to be adjusted and adapted in accordance to the strategy and focuses of Chinese government. Because of a generally low environmental awareness and poor environmental performance among Chinese industries, the greening revolution facilitated by UNIDO has to be started from those enterprises which are receiving great attention from the government.

3.4 Network and Alliance

Network and alliance, including industrial partnership, trade association and industrial environmental agencies, have been highlighted in past studies as a critical factor which can influence SMEs' uptake of environmental practices (Holt et al., 2000; Friedman and Miles, 2001; Lawrence *et al.*, 2006; Yu and Bell, 2006). Biondi *et al.* (2000) suggest that through networking SMEs can jointly address common problems and explore common opportunities, effectively exchange information and experiences as well as share resources. A network or alliance among SMEs in the same industrial sector or at the same geographic location is described as a group of organizations or individuals

who are able to offer assistance, advice or other forms of support on a specific issue, in this case, the environmental problem (Holt *et al.*, 2000). Network usually has a centralized coordinating hub, which defines the scope and direction of activities and provides a pool for diverse knowledge and ideas (Friedman and Miles, 2001; Lawrence *et al.*, 2006). The role of the coordinator is to collect and develop knowledge and awareness, and then transfer them to the member enterprises.

An effective network would be able to coordinate its members' activities and increase their educational and informational agility while reducing the transaction costs between individuals (Holt *et al.*, 2000; Lawrence *et al.*, 2006). By building a network connecting the SMEs, it can help maintain their motivation to undertake environmental initiatives in the business practice, under the encouragement and inspiration from each other's experiences in their environmental management (Friedman and Miles, 2001). To investigate the role of network in Chinese SMEs' environmental improvement, this research carried out a case study of the largest association of SMEs in China – China Association of Small and Medium Enterprises (CASME).

Case study: CASME

To promote the development of Chinese SMEs in a sound way, CASME⁵ was established in Beijing on December 10th, 2006, under the supervision of the National Development and Reform Commission and Ministry of Civil Affairs of the People's Republic of China. It is a non-profit organization founded voluntarily by managers of SMEs and other enterprises in China, as a link between the Chinese government and SMEs to collect suggestions and practical experiences to support better formulation of SME policies and regulations. The main goals of CASME are to help strengthen the competitiveness, to enhance self-innovation and self-development capabilities, and to improve the managerial competence of Chinese SMEs and to facilitate international exchange and cooperation between Chinese SMEs and foreign businesses or other organizations, etc. The main tasks of CASME include implementing SMEs Promotion Law, providing training, education and consultation to SMEs, establishing information and experience sharing platform, and designing strategies for SMEs' long-term development, etc. Members of CASME come from various industrial sectors and regions, including SMEs, large enterprises that support the development of SMEs, SMEs service-providing organization and social groups of SMEs, etc.

As revealed in the interview, the current focus of CASME is to create a better external environment for sustainable development of SMEs in China. Most of the work is concerning start-up financing, technical innovation, market exploration, and lawful rights and interests of SMEs, etc. A high priority is given to enhancing the economic performance of SMEs.

⁵ See <http://www.ca-sme.org/intro.asp>

As the public environmental awareness increases, CASME began to put more efforts in SMEs' environmental performance in recent years (See Table 3-4). However, changes are often brought by external stakeholders. For instance, the "Environment and Sustainable Development Forum" co-organized by CASME and Australia Victorian Government was held in February, 2008 in order to introduce advanced environmental technologies to Chinese SMEs, to enhance the communication and cooperation between Chinese SMEs and Australian corporations in areas of cleaner production, industrial pollution control and environmental protection, etc.

Table 3-4 CASME activities related to SMEs' environmental performance

Time	Location	Activities
April 2007	Beijing	Seminar on "SMEs' Application for Government Funds and Participation in Government Procurement"
August 2007	Beijing	Training Courses on Management of Energy Saving and Emission Reduction of Small- and Medium-sized Enterprises
February 2008	Beijing	Environment and Sustainable Development Forum
April-November 2008	Yulin, Wuxi, Xining, Xinzhou, Changchun	Training Courses about Advanced Energy Saving and Environmental Protection Technologies and "Wuxiao" Enterprises
July 2008	Beijing	Seminar and Training Courses on Corporate Social Responsibility of Small- and Medium-sized Enterprises

Another important incentive for CASME's efforts in improving SMEs' environmental performance is to implement the "Notification of Energy Conservation and Emission Reduction in Chinese Small- and Medium-sized Enterprises" released by the National Development and Reform Commission in 2007. Services have been provided by CASME's Technical and Managerial Innovation Service Centre to help SMEs implement the *Cleaner Production Promotion Law*, adopt advanced environmentally friendly technologies and achieve energy conservation and emission reduction targets set by local governments. Special attention has been paid to five types of small enterprises ("Wuxiao" enterprises), including small cement plant, small coal power plant, small printing and dyeing mill, small coal pit and small chemical plant, because they are relatively weak in achieving the targets. CASME also provides training and education services to help "Wuxiao" enterprises identify new opportunities in other business areas, choose and adopt suitable environmentally friendly technologies, and phase out obsolete production technologies, etc.

The information platform built by CASEM mainly focuses on new product

development, market exploration, technology and talent imports, and procurement information, etc. CASME also provides information about international environment-related expos and forums to encourage Chinese SMEs to exchange and cooperate with environmental industries in the worldwide. However, there is little information and experience exchange in adopting environmentally friendly initiatives or benefits obtained from improved environmental performance among members of CASME.

4. Conclusions and Discussions

SMEs in China make great contributions to not only the country's blooming economy but also the severe environmental degradation. Due to the weakness and various barriers encountered by SMEs, pressure and incentives from outside are needed to engage Chinese SMEs in an environmentally friendly and sustainable business agenda. External facilitators such as legal compliance of government regulations, supply chain partners, international aid and network can play critical roles in this process.

4.1 Chinese Government

Chinese government has made great efforts in formulating industrial cleaner production standards and guidelines, which aim to serve as a facilitator to improve the environmental performance of industries. However, those standards and guidelines seem too advanced and difficult to implement in SMEs. For instance, cleaner production standards clearly state that obsolete technologies can not be used even if an enterprise wants to achieve the standard of national average cleaner production technology; while in reality, most obsolete technologies in China are used by SMEs (NDRC, 2007). When dealing with cases of severe environmental pollution, Chinese government chooses to close heavily polluting factories rather than introduce more environmentally friendly operating models. Chinese government is now putting significant efforts in energy conservation and pollution control. Various types of technical support and training services have been provided, however, most of them choose state-owned large- and medium-enterprises as their target groups. There are very few training plans for SMEs in the environmental field.

The Chinese government has also formulated a comprehensive legislation framework in order to address the great environmental challenges faced by the country. There is an increasing awareness inside the government that it is very important for SMEs in China to achieve sustainable development; hence the government structure has been adjusted and relevant policies have been formulated to specifically target the SME group in China. However, there is no specific regulatory system designed to improve Chinese SMEs' environmental performance, although comprehensive environmental legislative system exists to address the industrial pollution in general. When it comes to sustainable industrial development, government's efforts on the initial investment, information transfer and changes are usually focused on large enterprises, especially state-owned enterprises. Although in recent years more attention has been shifted to promote the development of SMEs, most efforts are designated to carry out the capacity building of SMEs, to improve their managerial skills, and to provide financial support to facilitate innovation. Little attention is paid to improving SMEs' environmental performance.

In addition, as mentioned in many studies, the enforcement and implementation of environmental legislations is weak in China (Zeng *et al.*, 2005; Zhang *et al.*, 2008). Local

government often has a direct interest in local enterprises, most of which are SMEs. Many SMEs do not meet the discharge standards set up by local government and their violations of environmental regulations often get unpunished (Zeng *et al.*, 2005). This has largely reduced the effectiveness of national environmental regulations and legislations, and left severe environmental deterioration unsolved.

Supporting SMEs' cleaner production through the *Development Fund for SMEs* is currently Chinese government's most important effort to improve the environmental performance of SMEs. It is difficult for this research to evaluate the achievement and effectiveness of this fund. But through the examination of procedures and requirements for applying the SMEs development fund, it can be seen that it is a complicated and time-consuming process for SMEs in China to get financial support from government.

4.2 Supply Chain Partner

International standards and environmental certificates are affecting Chinese SMEs' environmental behavior directly through the supply chain pressure, as a company's environmental performance is becoming an increasingly important evaluation criterion in the supplier-selection process. SMEs, which are usually suppliers or potential suppliers of multinational companies, are especially influenced and have to achieve demanding environmental requirements set up by their customers.

Large multinational corporations are usually the leader in a supply chain which design environmental requirements and ask for commitment from upstream suppliers. SMEs in China have no other choices but to achieve their customers' environmental requirements. They have little bargaining power with multinational enterprises, since they risk being squeezed out from the supply chain at the failure of complying with private standards imposed by the buyers (Gugler and Shi 2009).

Large companies are mainly concerned with the product-related environmental performance, such as raw material choosing. They usually provide detailed environmental requirements and guidelines to their suppliers, and carry out random site-inspections to ensure continuous improvement. In order to strengthen their competitiveness and to get business contract, SMEs have to arrange funds and technical personnel by themselves to meet those requirements. Lack of financial and technical resources is an obvious obstacle for the Chinese SMEs, which has not been properly addressed by supply chain partners. In other words, there is little aid provided by the buyers to help SMEs fulfill the environmental requirements.

Although environmental investment has become an important part for SMEs which are active in the global supply chain, SMEs usually see little direct benefit from the improved environmental performance of the company, and they may not know how to bring additional profits to their businesses by improving their environmental

performances. Large companies often have the power to “demand discount prices” as well as “a better environmental performance” from suppliers, which might then distort SMEs’ competitiveness advantage brought by improved environmental practices (Jenkins, 2004). Therefore, further research is needed to explore means to strengthen SMEs’ competitiveness through and demonstrate financial returns from improved environmental performance.

4.3 International Aid

There are increasing aids from the international environment regime to help green Chinese industries. Technical and financial support is usually provided through demonstration projects. In many cases, international aid comes in to build on the initiatives and strategies of the Chinese government. National counterparts are the Chinese government sectors or public institutions under the administration of the government.

Although much effort is initially targeted at SMEs in China, international aid is often introduced to state-owned enterprises (SOEs), because the government sectors are in charge of selecting cooperative companies for the demonstration projects, and they have a traditional interest in SOEs. This has largely reduced the effectiveness and achievement of international efforts in helping green SMEs in China. Although most demonstration projects lose their targets at the environmental performance of Chinese SMEs, they play an important role in improving the environmental policy context of China, the industries’ environmental awareness and in introducing practical experiences of business environmental activities in China. This can facilitate the dissemination of industrial environmentally friendly initiatives among Chinese industries and the government, which can generate positive impact on greening Chinese SMEs in the long run.

4.4 Network and Alliance

Network and alliance of SMEs in China is mainly focused on promoting economic development of SMEs. Services are usually provided to improve SMEs’ competitiveness, explore new business opportunities and create better external environment for the sustainable development of Chinese SMEs. There is a low awareness of integrating environmental thinking into corporate’ daily operation to enhance SMEs’ competitiveness.

However, under the pressure of government’s policies regarding cleaner production, energy conservation and emission reduction, network of SMEs in China is starting to help Chinese SMEs achieve energy conservation and emission reduction targets set by local government. There are also opportunities brought by international agencies to help expose more SMEs to advanced environmental technologies and cleaner

production activities. Some association of SMEs has developed new services in this field, for example, providing training and education courses, and carrying out international exchange and cooperation, etc. To be noticed is that training and education services are free of charge when there is financial support available from external stakeholders. In this case, SMEs are more likely to attend the training courses.

In the process of promoting environmental activities in SMEs, the centralized coordinating hub of SMEs' association is playing a critical role while SME members are in a relevantly passive position. Most of the activities are still in the stage of environmental awareness arising. There is very limited information and experiences exchanging and sharing among SMEs regarding corporate environmental activities, which greatly reduces the effectiveness of network in enhancing SME's environmental performance.

4.5 Recommendations

By investigating into the Chinese SMEs and the four external facilitators in greening SMEs, it can be seen that the external 'heavy-handed' regulatory controls are still the main driver for greening SMEs in China. They seduce the sequential development of other facilitators.

This study reinforces that the strong advocacy of green business and its potential benefit in academia is not sufficient to translate SME managers into the committed green agents (Newton, 1997). There is still a low awareness among Chinese SMEs and the society about the corporate environmental activities, which hinders facilitators such as international aid and network & alliance to play an effective role in greening SMEs in China.

Corporate environmental activity is apparently a cross-cutting issue, especially at its implementation stage. SMEs' weakness in financial and technical aspects calls for proper interference from the society. It is necessary to bring multi-stakeholders together to create a better environment for SMEs to integrate environmental thinking into corporate activities. The leading position of Chinese government in influencing corporate environmental activities in China has to be amplified and extended to help improve SMEs' environmental performance. Specifically-designed policies targeting SMEs have to be formulated. More financial and technical assistance has to be readily offered to SMEs.

As there are increasing interests on SMEs and their environmental performance in China, and the government is working on mobilizing various financial and technical resources to promote the sustainable development of SMEs, it is necessary for international aid providers to carry out effective communication with the Chinese government regarding the government policies and initiatives concerning SMEs' environmental performance. Proper assistance can then be designed and provided to

complement and strengthen the national counterpart's capacity in helping green SMEs. The intervention points can be government policy formulation and implementation, establishment of favorable financial mechanism, and dissemination of experiences and information from other countries, etc.

SMEs are now faced with increasing pressure from their customers. Compared to the motivating factor of legal compliance, environmental requirements from supply chain have led to a more proactive action among many SMEs, resulting in significant improvements of environmental performance of SMEs. It will be useful to further compare government environmental regulations and corporation's environmental requirements in the supply chain, and to explore the possibility of achieving government environmental legislations through greening the supply chain. Further research is needed in this area.

Business associations and networks in China are usually guided by economic incentives. But there is a great chance for them to act as a platform to disseminate information about benefits of improving the corporate environmental performance in SMEs. In other words, they can play a critical role to demonstrate and persuade SMEs that green business is worth long-term investments. Experience and information obtained from individual companies can be shared and exchanged through the networks. Networks can also play important roles in communicating government policies and available financial resources to SMEs. For instance, lectures about how to apply for the *Development Fund for SMEs* to implement cleaner production in SMEs can be provided. It will be also useful for associations to cooperate with international aid providers to get financial and technical assistance, which can be used to provide more free training and education services to SMEs

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Abbreviations

CASME	China Association of Small- and Medium-sized Enterprises
CNCPC	China National Cleaner Production Center
CSR	Corporate Social Responsibility
EMS	Environmental Management System
EPBs	Environmental Protection Bureaus
GDP	Gross Domestic Product
KME	Korean Ministry of Environment
MEP	Ministry of Environment
MF	Ministry of Finance
MIIT	Ministry of Industry and Information Technology
NDRC	National Development and Reform Commission
ROHS	Restriction of Hazardous Substances
SEPA	State Environmental Protection Administration
SETC	State Economic and Trade Commission
SMEs	Small- and Medium-sized Enterprises
SOEs	State-owned Enterprises
UN	United Nations
UNEP	United Nations Environment Program
UNIDO	United Nations Industrial Development Organization
WB	World Bank

Appendix 1. List of Document Examined

Organization	Document Name
	Supplier Evaluation Form
	Social Accountability Declaration
Nolato	Environment Friendly Declaration
	Nolato Banned and Restricted Substances List
	Independent Evaluation of the UNIDO-UNEP Cleaner Production Programme
UNIDO	Independent Evaluation of the UNIDO-UNEP Cleaner Production Programme - Country Evaluation Report : P.R. of China

Appendix 2. Cleaner Production Standards in China

- Cleaner production standard -**Petroleum refinery industry** (HJ/T 125-2003)
- Cleaner production standard -**Coking industry** (HJ/T 126-2003)
- Cleaner production standard -**Tanning industry(Pig leather)** (HJ/T 127-2003)
- Cleaner production standard-**Brewing industry** (HJ/T 183-2006)
- Cleaner production standard- **Edible vegetable oil industry(Soya-bean oil and Soya-bean cake)** (HJ/T 184-2006)
- Cleaner production standard-**Textile industry (Dyeing and finishing of cotton)** (HJ/T 185-2006)
- Cleaner production standard-**Cane sugar industry** (HJ/T 186-2006)
- Cleaner production standard -**Aluminium electrolytic industry** (HJ/T 187-2006)
- Cleaner Production Standard-**Nitrogenous Fertilizer Industry** (HJ/T 188-2006)
- Cleaner production standard-**Iron and Steel industry** (HJ/T 189-2006)
- Cleaner production standard- **Basic chemical raw material industry (Ethylene oxide & ethylene glycol)** (HJ/T 190-2006)
- Cleaner production standard-**Automobile manufacturing (Painting)** (HJ/T 293-2006)
- Cleaner production standard- **Iron ore mining and mineral processing industry** (HJ/T 294-2006)
- Cleaner production standard-**Plating & surface finishing industry** (HJ/T 314-2006)
- Cleaner production standard-**Wood based panel industry (medium density fibreboard)** (HJ/T 315—2006)
- Cleaner production standard-**Dairy products manufacture (Pure milk and whole milk powder)** (HJ/T 316—2006)
- Cleaner production standard-**Process of bleached alkali bagasse pulp in paper industry** (HJ/T 317-2006)
- Cleaner production standard-**Steel rolling (plate) industry** (HJ/T 318-2006)
- Cleaner production standard-**Production of bleached soda straw pulp, paper industry** (HJ/T 339-2007)
- Cleaner production standard-**Production of kraft chemical wood-pulp, paper industry** (HJ/T 340-2007)
- Cleaner production standard - **Manganese electrolytic industry** (HJ/T357-2007)
- Cleaner production standard-**Nickel ore processing** (HJ/T 358-2007)
- Cleaner production standard - **Chemical fibre industry (Spandex)** (HJ/T359-2007)
- Cleaner production standard - **Colour picture (display) tube industry** (HJ/T360/2007)

- Cleaner production standard -**Flat glass industry** (HJ/T 361-2007)
- Cleaner production standard- **Tobacco industry** (HJ/T 401-2007)
- Cleaner production standard-**Liquor industry** (HJ/T 402-2007)
- Cleaner production standard – **Sintering industry** (HJ/T 426-2008)
- Cleaner production standard - **Blast furnace** (HJ/T 427-2008)
- Cleaner production standard –**Steel-making industry** (HJ/T 428-2008)
- Cleaner production standard - Chemical fibre industry (polyester fibre) (HJ/T 429-2008)
- Cleaner production standard—Calcium carbide industry (HJ/T 430-2008)
- Cleaner production standard- Petroleum refinery industry (semi-asphaltic flux) (HJ 443-2008)
- Cleaner production standard– Monosodium glutamate industry (HJ 444-2008)
- Cleaner production standard—Corn starch industry (HJ 445-2008)
- Cleaner production standard- Coal mining and processing industry (HJ 446-2008)
- Cleaner production standard- Lead acid battery industry (HJ 447-2008)
- Cleaner production standard- Tanning industry (Bovine leather) (HJ 448-2008)
- Cleaner production standard- Synthetic leather industry (HJ 449-2008)
- Cleaner production standard- Printed circuit board manufacturing (HJ 450-2008)
- Cleaner production standard- Wine industry (HJ 452-2008)
- Cleaner production standard- Cement industry (HJ 467—2009)
- Cleaner production standard- Waste paper pulping (paper industry) (HJ 468—2009)
- Cleaner production standard- Ferroalloy industry(HJ 470—2009)

Appendix 3. Nolato's Supplier Evaluation- Environment

1	Is there environmental policy and is everyone in the company familiar with it?
2	Are there any environmental goals and are these followed up in the company?
3	Is there an established environment management system, e.g. ISO 14000, EMAS?
4	Is there internal audit involved environment management system?
5	Is there training plan include environment and is it implemented?
6	Did supplier sign the environment friendly declaration from Nolato?
7	Is the ICP report, chemical ingredient list or MSDS of other components available as required and update yearly?
8	Are environment requirements passed and required to supplier?
9	Are there any inspection rules for the environment related substance to be controlled in incoming parts/material?
10	Is there a rule to assess the modification of products in mass production according to the environment friendly requirement?
11	Is there a rule to inform customer the modification of products in mass production?
12	Are there plans or activities to improve the existing processes with regard to the environment?
13	Are there routines to handle excess or rejected material in an environmentally friendly manner?
14	Are there routines for recycling used packing materials?
