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Standards for Sustainable Development:

Sustainable China Trade Strategy Project

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This paper is produced as part of the Sustainable China Trade Project. The project is a joint effort of IISD and the Development Research Centre of the State Council of China, with research jointly conducted by Chinese and international experts. It seeks to help define the characteristics of a sustainable trade strategy for China—a strategy that helps contribute to environmental, social and economic improvements, primarily in China but also globally. Such an outcome is in line with the scientific concept of development first put forward at the 16th National Congress of the Communist Party of China in 2003, and with many of the goals of the 11th Five-Year Plan. The project will produce a series of eight working papers focusing on specific aspects of a sustainable trade strategy for China and a synthesized volume covering the body of work. The Sustainable China Trade Project is generously supported by the Swiss Agency for Development Cooperation.

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Table of contents

List of acronyms

AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
CFCs	chlorofluorocarbons
EPA	U.S. Environmental Protection Agency
ETI	Ethical Trading Initiative
GAP	good agricultural practices
GATT	General Agreement on Tariffs and Trade
HACCP	Hazard Analysis and Critical Control Point
HCFCs	hydrochlorofluorocarbons
ISO	International Organization for Standardization
NGO	non-governmental organizations
OECD	Organisation for Economic Co-operation and Development
PCBs	polychlorinated biphenyls
SPS	sanitary and phytosanitary measures
TBT	technical barriers to trade
WTO	World Trade Organization

1.0 China and the intersection of trade, standards, environmental responsibility and sustainability

China is one of the fastest-growing economies in the world. After several decades of a modest, domestically oriented commercial system and more than 30 years of opening and reform, China has emerged as a major trading force, competitive with all of the major international economic players. As described in this series' Chinese overview paper, *Sustainable China Trade: A Conceptual Framework,* in recent years Chinese industries have received significant investment from international corporations and have become some of the world's primary exporters; trade has become a foundation of the Chinese economy. However, despite these swift strides in economic development, China and its industries have been criticized for their environmental track record. This paper will argue that in today's world of increased societal concern for and awareness of environmental issues, the perception of problems with China's environmental performance has become a liability for the nation's continued economic competitiveness in the international market.

Environmental standards have become one manifestation of these growing societal concerns and have emerged as the focal point of pressures emanating from foreign markets. Indeed, such standards are being implemented as a key mechanism with which to influence environmental performance and product quality around the world, including in China. Within the context of this paper, we use the term "standard" broadly, to include sanitary or phytosanitary standards, foreign technical regulations, and private international standards that have either become de facto conditions of sale because of widespread market demand or have emerged as "best-in-class" designations associated with improved competitive advantage and brand reputation. In all cases, fostering the ability of exporters to meet such demanding foreign standards is the key to China's export success in the large developed country markets and will serve as a prerequisite to building up the threatened "Brand China." It will also likely have the incidental benefits of reducing pollution, improving public health and long-term natural resource sustainability, and increasing production efficiencies in China's export sector.

Conversely, taking no action will likely result in further degradation of China's environmental reputation as well as the natural resources and ecosystem services on which its economy depends. In the long run, it may also result in foreign investment being redirected to more environmentally friendly markets. Thus, this paper argues that improved compliance with such environmental standards is imperative for China's long-term economic and environmental well-being.

The overarching goal of this report is to illustrate not only how non-compliance with foreign standards is an economic liability for Chinese industries but also how compliance can in fact provide a significant business opportunity. It will also demonstrate that governments have a crucial role to

play in inducing manufacturers' uptake of regulations and standards by creating consistent domestic environmental regulations, establishing and ensuring functional domestic standards development and conformity-assessment infrastructure, and building the capacity of domestic manufacturers to comply with both foreign regulations and voluntary international standards. Should the Chinese government choose to take such actions, it will be better prepared to perpetuate the country's rapid economic growth while rebuilding its environmental image and greatly improving the quality of life and environmental conditions for its people.

This paper will look at China's current situation with respect to foreign standards and its own domestic systems for meeting them, and will make policy recommendations for improvements. We begin with a brief overview of the economic and environmental status of Chinese industries, emphasizing the role of standards in accentuating the tension between continued economic viability and improved environmental performance. It will also provide a close look, in particular, at some of China's major export sectors, including mechanical and electrical products, textiles and apparel, and agricultural products, describing some of the key environmental issues facing those industries and what can be done to correct them. Descriptions of standards to which Chinese industries are subject will be supplemented by a general overview of trends in international trade, environmental regulation and consumer expectations, as well as a summary of the findings of academic research on the economic benefits of environmental regulation. The report concludes with policy options geared toward addressing the environmental and economic challenges facing China.

2.0 Sustainability and standards in China

Global trade is deeply dependent on international standards. Among other functions, international standards help ensure technical compatibility of goods traded across countries. They can also convey information to consumers about product characteristics, quality and performance—and in some cases about the processes by which products were produced. Standards can help commerce within and between countries flow more smoothly. Concern with how standards affect international trade has long been reflected in multilateral trade rules, with the General Agreement on Tariffs and Trade (GATT) containing provisions relevant to technical regulation and standards. The Agreement on Technical Barriers to Trade (TBT Agreement) is one of two key World Trade Organization (WTO) agreements that directly refer to international standards and encourage harmonization based on them, along with the agriculturally focused Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement).

Although the term "standard" is commonly used generically to refer to any official stipulations that guide the characteristics or process and production methods of a product, it has a precise meaning in the context of international trade law. According to the WTO's TBT Agreement, a standard is defined as a

> document approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, **with which compliance is not mandatory**. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method. (Emphasis added.)

Conversely, under TBT terminology a technical regulation is defined as a

> document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, **with which compliance is mandatory**. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method. (Emphasis added.)

Technical regulations, also known as regulatory standards, are mandatory stipulations governing production or market access. They are designed to achieve policy objectives such as product safety, quality or environmental protection. Technical regulations can be placed on manufacturers or suppliers by domestic governments or, in the case of Chinese businesses, act as import restrictions set by foreign governments. In other words, a manufacturer could be guided both by domestic

regulations (which restrict products produced within the manufacturer's home country) and by foreign regulations (which restrict products sold in foreign markets). Thus technical regulations gain importance by being a prerequisite for market access, but are generally not designed to create competitive advantage—in fact, the TBT and SPS agreements were created to prevent the latter. Rather, technical regulations utilize a negative reinforcement model that punishes poor performance.

The distinction between voluntary (standards) and mandatory (technical regulations) in the context of the WTO is simply a function of a government's inclination to move the former into the latter category, either by referencing it in its technical regulations or by adopting it directly into law. One of the key principles promoted through the WTO agreements is "harmonization" of domestic measures with international standards. Specifically, Article 2.4 of the TBT harmonization provisions requires that where international standards exist, central governments should use them as a basis for domestic technical regulations, unless a government can argue that the international standard would not fulfill its country's legitimate policy objectives. Article 4 and Annex 3.F contain similar obligations with respect to standards.

Although theoretically any standard could be considered an "international standard," from the perspective of the WTO, international standards are those developed by a handful of recognized international standardization bodies. Such bodies are treaty-based organizations (where only governments are the primary members), such as the International Telecommunication Union or Codex Alimentarius, or select quasi-private institutions such as the International Organization for Standardization (ISO) or the International Electrotechnical Commission (where members are a mixture of non-governmental organizations and governmental agencies). While lacking official recognition within the context of the WTO system, as discussed in this report, international standards are increasingly being developed through collaborative multistakeholder initiatives consisting of non-governmental organizations, private sector players and other civil society groups.

This report focuses primarily on foreign technical regulations, as they present perhaps the most urgent dilemma for Chinese manufacturers. However, it will also address voluntary private international standards where they are becoming de facto conditions of sale for foreign markets due to the widespread demand for them in these markets. It is because of the high regard given such private standards by consumers in China's key foreign markets that conformity to them may be as critical to China's efforts to improve Brand China as is compliance with compulsory technical regulations. Indeed, this report will illustrate that the distinction between the voluntary and mandatory nature of different international standards is increasingly blurring, as is the conceptual and practical differentiation among private standards, quasi-private standards and technical regulations. Notably excluded from this analysis are standards in the form of individual corporate supply chain requirements or those established within the context of private trading relationships between buyers and sellers.

2.1 Economic growth and the environment in China

Over the past two decades a growing tension has emerged between China and its major trading partners regarding China's environmental record. Not coincidentally, this tension has arisen over a period of time when China's economy has transformed from developing mostly domestically distributed goods into the world's second largest exporter. As described in *Sustainable China Trade: A Conceptual Framework,* Chinese industries typically act as intermediate manufacturers that supply inputs to international corporations for assembly into final retail products. This fragment of industrial production is resource and energy intensive, and thus has a high environmental impact, making China's economy relatively more reliant on natural resources than that of many Organisation for Economic Co-operation and Development (OECD) countries. This intermediate-level production is also inherently less profitable, and as a result China has sought to gain a larger foothold in more profitable research and development, marketing and ownership of international brands.

Arguably one of the greatest obstacles in infiltrating this more publicly visible fragment of production is the damaged Brand China, which has been negatively affected by the perception of Chinese industry as environmentally and socially irresponsible—for example, regarding human rights and labour issues (Kasriel, 2008). China's economic growth has brought with it increases in industrial pollution, deforestation, widespread smog in major urban areas, freshwater scarcity and the tainting of major freshwater systems by industrial effluent (Dean & Lovely, 2008). China increasingly has a reputation as a poor environmental actor in terms of domestic policies, production methods and local impacts. Chinese exports are often associated with poor environmental and labour practices as well as environmental health and product quality concerns. China is widely cited as a case study in the kinds of environmental degradation and human health impacts that can come from unsustainable economic development.

In 2007 China's State Environmental Protection Administration found 48 per cent of major lakes and reservoirs in China to be "heavily polluted" (Dean & Lovely, 2008). Of China's 600 largest cities, 400 suffer from water shortages, and China has about 25 per cent of the world's average water resources per capita. China's air quality is considered to be among the worst in the world, with sulphur dioxide concentrations increasing, a growing number of cities experiencing highly acidic rain, insufficient regulations on volatile organic compounds and other toxic air pollutants, and insufficient enforcement of existing air pollution regulations and permit conditions (OECD, 2006). Only 1 per cent of the over 500 million city dwellers in China breathe air considered safe by European Union standards (Kahn & Yardley, 2008). The amounts of municipal, industrial and hazardous wastes far exceed the nation's ability to safely treat and dispose of them. For instance, almost half of municipal waste is either stored untreated or dumped in an uncontrolled manner (OECD, 2006). Furthermore, even though China's per capita emissions of greenhouse gases remain quite low, China is now the world's leading emitter of greenhouse gases, with emissions increasing 8 per cent between 2007 and

2008, accounting for two-thirds of global emission growth in 2007 (Rosenthal, 2008). China's industries are believed responsible for much of this environmental degradation, and much of the pressure for environmental reform has been placed on them.

Such environmental degradation is now being recognized as an economic liability rather than the root of competitive advantage it may have been in the past. China's State Environmental Protection Administration has argued:

> The conflict between environment and development is becoming even more prominent. Relative shortage of resources, a fragile ecological environment and insufficient environmental capacity are becoming critical problems hindering China's development. (Dean & Lovely, 2008)

Furthermore, China's growth over the past 20 years, though impressive, has had a multitude of hidden environmental and economic costs. A 1997 World Bank report estimated that air pollution alone cost roughly 7 per cent of China's GDP in 1995 (Johnson, Feng & Newfarmer, 1998). A variety of studies by Western and Chinese researchers alike have estimated the cost of total ecological damage in China to be anywhere from 5 to 14 per cent of China's GDP (U.S. Embassy Beijing, 2008). A 1999 study at the Georgia Institute of Technology estimated that reduced sunlight caused by air pollution has damaged crop yields in 70 per cent of Chinese farms by anywhere from 5 to 30 per cent (Chameides, 1999). One hundred and eighty thousand hectares of Chinese farmland become salinized every year, depressing productivity by 25 to 75 per cent. Five billion tons of soil erode annually, an amount of organic matter equal to roughly twice the national production of chemical fertilizers (Zhang, 1993). Acid rain falls on roughly one-third of China, creating public health concerns and hurting yield and quality of agricultural production ("Third of China," 2006). Environmental degradation also has numerous indirect impacts on China's economy, many stemming from the costs of a variety of public health concerns caused by water, air and soil pollution (U.S. Embassy Beijing, 2000).

2.2 Pressure on China's industries to conform to high environmental and quality standards

China's exporters and domestic producers have faced increasing pressure in recent years over standards that protect the environment, health and safety. In the areas of health and safety, highly publicized recalls of dangerous products have included pet food tainted with melanine (an adulterant that leads to kidney failure), hundreds of different lines of children's toys and clothing containing high levels of lead (a neurotoxin), toothpaste containing diethylene glycol (a toxin), and heparin—an anticoagulant used in surgeries and medical procedures—contaminated with oversulfated chondroitin sulphate. As well as these high-profile cases, which achieved widespread coverage in

international media, there have been scores of quieter recalls related to problems with specific Chinese exporters. In April 2007 alone, the following recalls were enacted in the United States, according to U.S. Consumer Product Safety Commission records:[1]

- A&A Global Industries issued a recall for about 4 million of its children's Groovy Grabber bracelets, which were painted with paint that contained high levels of lead.
- Aviv Judaica Imports recalled its Chanukah oil candle sets after it was found that they can become engulfed in flames and melt the plastic cups holding the candles in place, allowing hot wax to leak out, which poses fire and burn hazards to consumers.
- Holmes Group recalled about 300,000 of its oil-filled electric heaters after discovering that a poor electrical connection within the Chinese-manufactured heaters could overheat and cause fires.
- Coby Electronics recalled over 13,000 USB/MP3/CD players due to electrical problems that could cause them to overheat and catch fire.
- Infant bouncer seats were recalled by Oeuf after reports of the seats' metal frames breaking.
- Disney Stores recalled its Baby Einstein Caterpillar sleepwear and Baby Einstein Duck sleepwear because of a failure to meet the children's flammability standard, posing a risk of burn injury to children.
- McCormick Distilling recalled 60,000 Tequila Rose Strawberry Cream candle sets after finding that the martini glass containing the gel candle can break while the candle is burning, posing fire and burn hazards to consumers.
- Two Chinese companies intentionally exported contaminated pet food ingredients, killing hundreds of pets that ate the food.[2]
- Dollar General Merchandising recalled about 400,000 Chinese-manufactured keychains because they contained high levels of lead.
- iObjectSolutions Inc.'s Chinese-made pre-lit palm trees were found to have electrical problems with their lighting system, which could cause fires or electric shocks.

This number of cases is not unusual. In the first six months of 2007 an average of over eight Chinese products per month were recalled in the United States, some involving millions of items. The string of high-profile international recalls and scandals has focused the spotlight on China's domestic institutions for propounding and enforcing standards. As part of the government's efforts to address the problem, and in the wake of unprecedented domestic scandals over melamine-contaminated milk products for babies and contaminated leukemia drugs, the former head of China's State Food and Drug Administration was tried on corruption charges in July 2007, found guilty and sentenced to death.

[1] Retrieved from www.cpsc.gov/cpscpub/prerel/prerel.html, except where noted.
[2] www.iht.com/articles/2007/05/09/business/petfood.php.

In the area of environmental standards, the problem is different. While there are cases of individual manufacturers flouting environmental regulations, these specific cases are not so well-known internationally. The bigger problem is a perception of low environmental standards in general for China's manufacturers. The OECD environmental review conducted in 2007 revealed a wide array of domestic environmental problems, often stemming from an inability to fully enforce standards and regulations that currently exist.[3] These problems include high energy intensity of production, associated pollution by sulphur oxides and nitrogen oxides and the resulting acid rain, poor urban air quality, highly polluted major waterways and coastal waters, and a growing problem of hazardous waste storage and accumulation (OECD, 2007). As well, the magnitude of the Chinese economy makes any global pollution more newsworthy. Although its per capita emissions are low by international standards (at 3.9 tonnes per capita of carbon dioxide emissions in 2004, versus 20.6 for the United States), China is now the world's leading emitter of greenhouse gases. These sorts of statistics are also well-known internationally, and can too easily become ammunition for protectionists in foreign markets who want to shield their industries against competition from Chinese imports.

A case in point is the inclusion in a number of pieces of proposed U.S. legislation of border measures that aim to protect U.S. producers from competition from countries where action on climate change is not comparable to U.S. efforts. The proposed requirements would force importers to purchase carbon offsets to "level the playing field" between U.S. and foreign producers. Such measures have been included in a number of bills submitted to the U.S. Congress, including the Bingaman-Specter Low Carbon Economy Act of 2007 (S. 1766), the Lieberman-Warner Climate Security Act of 2007 (S. 2191) and the Dingell-Boucher draft legislation released in October 2008. They are also a fundamental part of the climate and energy bill passed by the U.S. House of Representatives in 2009 (the American Clean Energy and Security Act of 2009). As Cosbey (2008) argues, no U.S. cap-and-trade scheme will be implemented without the use of such trade measures. China would be one of the major targets of such measures; Houser, Bradley, Childs, Werksman & Heilmayr (2008, p. 45) refer to U.S. policy-makers' "concern about carbon-intensive imports from China."

In the case of both environmental concerns and health and safety concerns, it is necessary to put the problems in perspective. Only a miniscule percentage of China's total exports have been affected by recalls, and to date no trade measures have actually been enacted that punish China's exports on the basis of environmental problems caused by production methods, though such measures are likely in the future, as noted above. The bigger problem in both cases may be the impact on consumers' willingness to purchase a broad range of Chinese-made products.

News reports based on relatively few cases can greatly magnify these sorts of impacts. High-profile cases in recent years have resulted in growing consumer concern, demonstrated most clearly in the

[3] For an analysis of enforcement problems, see McElwee (2008).

recent support in U.S. and European markets for a "China-free" label (Kasriel, 2008; Han, 2007). A poll by MSNBC showed that 77 per cent of almost 10,000 people polled supported a "China-free" label. A 2007 Reuters/Zogby poll showed that 78 per cent of Americans worry about the safety of Chinese imported goods, while 25 per cent have stopped buying Chinese goods altogether and 23 per cent no longer buy Chinese toys. A separate Angus Reid poll showed that 62 per cent of Canadians would consider a temporary ban of Chinese imports in order to encourage more responsible product standards (Kasriel, 2008). Some Asian consumers have also become averse to Chinese products; certain Korean companies traditionally sourcing from China have now opted for homegrown goods or goods from "trustworthy" countries such as Australia, despite significantly increased prices, due to the heightened consumer demand for safe food products (Han, 2007). The simultaneous occurrence of increasing global consumer environmental awareness and concern regarding the quality of China's products has led to the diminishment of Brand China, creating a significant dilemma for China: can it remain economically competitive without demonstrably improving its environmental performance?

3.0 Description of the present situation in China

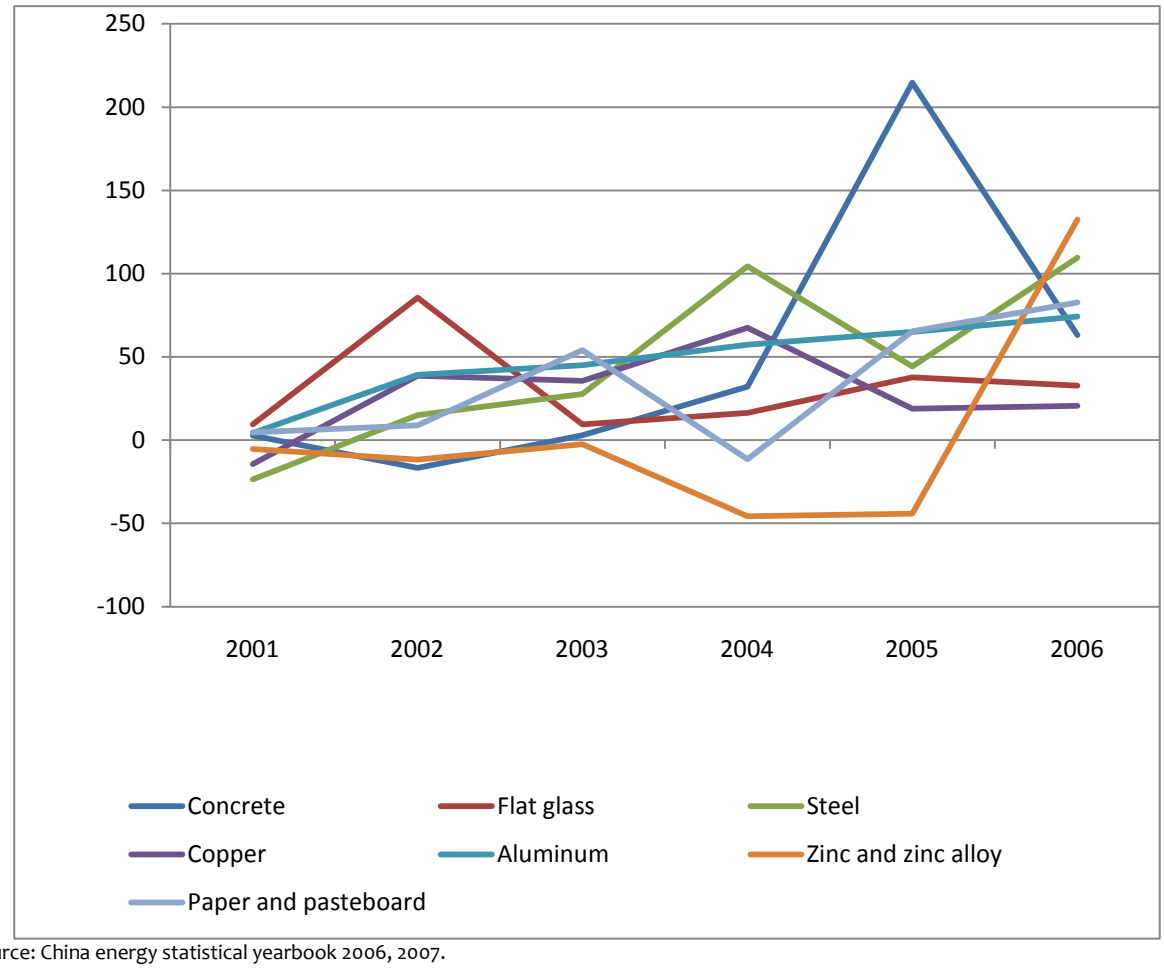
The concept of sustainable development was first put forward in *Our Common Future*, published by the UN World Commission on Environment and Development in 1987, which defined the phrase as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Based on this definition, the 2004 UN report *Agenda 21* further discussed the relationship between trade and sustainable development. The report concluded that a trading system consistent with the goals of sustainable development is of benefit to all trading partners.

Chinese president Hu Jintao's (2007) report to the 17th National Congress of the Communist Party of China lists the following goals: to bring Chinese civilization into harmony with the environment and to form industry structures, growth patterns and modes of consumption that protect the environment and promote energy efficiency. In keeping with these goals, and with the research into the relationship between trade and sustainable development put forward in *Agenda 21,* this paper examines the application of the sustainable development concept to trade and breaks down the different traits of sustainable trade: sustainable development of trade should not only be reflected in the total volume of foreign trade growth and improvement of foreign trade structure and quality but also in the conservation of resources and the environment, a reduced population growth rate and increased social harmony. Specifically, in order to keep foreign trade sustainable, the government should maintain the country's ecosystems and the sustainability of natural resources through a series of trade policies and promote the expansion of foreign economic activity that will improve both social and ecological benefits. The essence of achieving sustainable development is to make the interests of foreign trade and economic growth contingent upon protecting the environment and conserving resources. But when we use this standard to analyze the characteristics of China's import and export commodities, we can conclude that China's traditional foreign trade development model is inconsistent with the requirements of sustainable trade.

3.1 Traits of exports not suitable for sustainable development

The competitive advantages of China's exports largely depend on natural resource and cheap labour, as well as the different degrees of favour negotiated by provincial governments under foreign trade policies. The quantity of major high-energy-consumption exports grew rapidly in recent years (see Figure 3.1).

Figure 3.1 **Growth rate (%) of Chinese high-energy-consumption exports.**



Source: China energy statistical yearbook 2006, 2007.

As shown in Figure 3.1, from 2001 to 2006 exports of concrete, aluminum, paper and pasteboard grew rapidly. The 2005 growth rates above 50 per cent, and particularly the growth rate of over 200 per cent for concrete, are particularly notable; in 2006 the growth of primary high-energy-consumption exports increased stably—only concrete exports decreased, and all others had growth rates above 20 per cent. Exports of zinc and zinc alloys dropped in 2004 and 2005, but in 2006 grew 132 per cent. These high-energy-consumption exports destroy soil, air and natural resources, so these exports are not suitable for trade that meets the demands of sustainable development.

Rapid growth of high-energy-consumption exports directly caused the current high proportion of Chinese exports not suitable for sustainable development: at present, labour-intensive export products—mainly agricultural products, foodstuffs, textiles, plastic products and toys—still make up a larger proportion of China's exports. These exports have lower technology and rely primarily on cheap land, resources and labour, whose exploitation is bad for China's environment. This means that the Chinese traditional competitive trade advantage is weakening today.

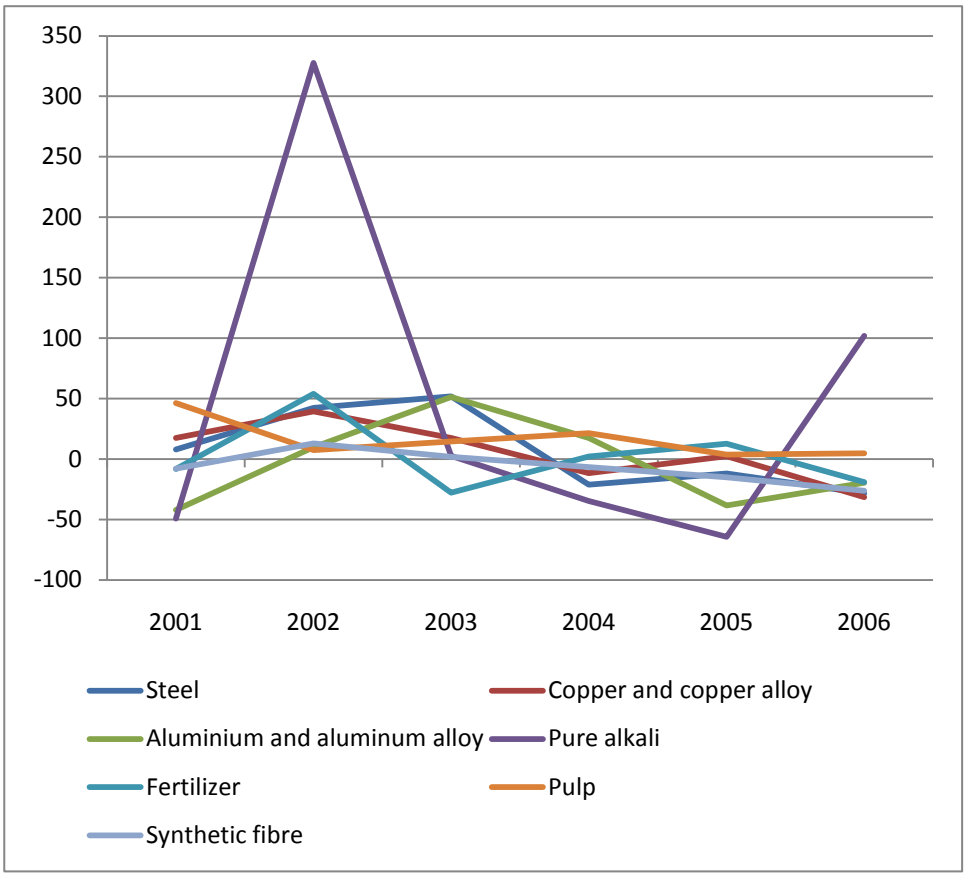
China's technology-intensive export products are divided into two types. The first comprises exports for which only simple processing and assembly are completed in China. Production of these products, such as machinery and transport equipment, electronic components and circuit boards, still relies on a cheap labour force and has a negative impact on the environment. Therefore, in terms of the distribution of trade benefits, such technology-intensive products are actually a kind of labour-intensive product, whose production in China is focused on processing and assembly. At present, most of China's exports of technology-intensive products belong to this type. The other types of technology-intensive export products are products requiring complicated processing and high-tech products that carry intellectual property rights. Such products have high technology, high added value, and less influence on resources and the environment. However, they make up a much lower proportion of China's total exports.

The trade in services in China is relatively backward compared to trade of goods. Trade in services has the traits of lower energy consumption, higher technological content and high added value, so focus on the development of the services trade will help China convert its current trade pattern to one that is consistent with sustainable development and is less reliant on resources and environmental degradation.

3.2 Traits of imports not suitable for sustainable development

China's imports of primary products mainly include steel, wool, copper and chemical raw materials. The growth of imports of primary products showed a downward trend from 2001 to 2006 (see Figure 3.2), but the quantity of fossil fuel, lubricating oil and other raw material imports increased steadily each year. Industrial imports mainly include machinery and transport equipment, textiles, rubber products, chemical products, automobiles, aircraft, electronic equipment and computers, and other technology-intensive products. Because the processing of primary products and the manufacture or consumption of industrial products all consume a large amount of energy, these products severely pollute the environment.

Figure 3.2 Growth rate (%) of primary high-energy-consumption imports.



Source: China energy statistical yearbook 2006, 2007.

Figure 3.2 shows that the growth of imports of high-energy-consumption products such as steel products, copper and copper alloys, soda ash, fertilizer and paper pulp slowed between 2001 and 2006. But according to customs statistics, agricultural products such as cereals and cereal powder, rubber, paper pulp, minerals, crude oil, steel products, primary plastics and non-forged metal still rank top among China's import commodities. These are semi-finished products that need further processing or production, have high energy consumption and are highly polluting. The environments of Chinese coastal regions such as Guangdong Province have been heavily damaged because of the country's export-oriented import model wherein many of China's imports turn into exports after processing. In order to reduce the overreliance of imports on resources and the environment, it is important for China to change its traditional trade model and the structure of imported goods controlled by export-oriented processing enterprises. So the demand for sustainable development also puts forward new challenges to China's import structure.

The above analysis shows that China's import and export commodities have the characteristics of high energy consumption and high pollution. This static, resource-based comparative advantage of

foreign trade development does not meet the requirement of sustainable trade. In recent years, especially when domestic labour costs began to rise, the Chinese government has begun to recognize the importance of protecting resources and the environment, as well as of adding environmental costs to export production costs.

3.3 Further analysis of major export products

Mechanical and electrical products and textiles have kept the top two spots in China's export ranking for a long time, and China exports large quantities of agricultural products. These three sectors are also the targets of the largest proportion of the restraints from foreign TBTs. For example, in 2005 exports of agricultural products, food, machinery, and textiles and clothing were subject to more than 80 per cent of the restraints from TBT (General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China [AQSIQ], 2006).[4] This section investigates these three sectors to demonstrate the main problems China faces in overcoming foreign TBT.

3.3.1 Mechanical and electrical products

Mechanical and electrical products have ranked first among all of China's export commodities for 14 years running and are an important driving force for the sustained growth of China's exports. China's share of mechanical and electrical products in the world export total rose from 3.4 per cent during the 9th Five-Year Plan (1996 through 2000) to 8.5 per cent during the 10th Five-Year Plan (2001 through 2005). China has become the fourth-largest exporter of mechanical and electrical products in the world, following Germany, the United States and Japan.

While maintaining a rapid total growth, China's exports of mechanical and electrical products have shown a marked improvement in structure. The export of high-tech mechanical and electrical products increased from US$35.03 billion in 2000 to over US$200 billion in 2005 and US$347.83 billion in 2007, for an average annual growth rate of 43.5 per cent—accounting for over 50 per cent of total exports of mechanical and electrical products.

In spite of the rapid growth of China's exports of mechanical and electrical products, some issues remain, such as insufficient investment in research and development and weak innovation capability, lack of independent intellectual property and core technology, underdevelopment of high-tech and high-value-added products, and increasing trade frictions. Therefore, China's government needs to take measures to further enhance the international competitiveness of export enterprises, optimize the export structure and improve the current export order—wherein companies within China follow no consistent competitive rules, so often can only compete on price.

[4] Agriculture and food products: 42 per cent, machine products: 21.7 per cent, textile and clothing products: 21.5 per cent.

3.3.2 *Textiles*

After China's entrance into the WTO, its exports of textiles and clothing grew from US$53.44 billion 2001 to US$175.62 billion in 2007, an increase of more than 300 per cent. In 2007 China's exports of textiles and clothing chalked up a year-over-year increase of 19.11 per cent, accounting for 14.42 per cent of total exports. The value of textile exports was US$60.5 billion, up 15.86 per cent, and that of clothing was US$115.07 billion, up 20.89 per cent. Most of the exported textiles and clothing go to the United States and Japan or are exported via Hong Kong.

At present, four negative factors affect China's exports of textiles and clothing. First, the appreciation of the yuan will further weaken China's price advantage; second, the industry is affected by the Chinese government's downward adjustment of rebates from export taxes; third, starting in 2005, some special clauses in China's WTO commitments began restricting China's exports of textiles and clothing; and fourth, resources and environmental issues have become a constraint on the development of China's textile industry.

3.3.3 *Agricultural products*

In 2004 China's trade in agricultural products accounted for 3.2 per cent of the world total, ranking the country fifth among the leading traders in agricultural products. But the country's trade deficit for agricultural products was as high as US$4.64 billion. China's export of agricultural products grew considerably in 2006, reducing the deficit to US$4.08 billion in 2007.

At present, China's agricultural trade deficit is shrinking, and all the major export regions show growth trends that are satisfactory from the Chinese perspective. China's trade of agricultural products relies mainly on the eastern coastal areas. Exports from the six largest export regions, including Shandong, Guangdong, Zhejiang, Fujian, Liaoning and Jiangsu, account for around 70 per cent of the national total, with Shandong remaining at the top. Asia is still the largest export market for China's agricultural products, followed by Europe and North America. With the implementation of policies and measures for the development of modern agriculture, China will further enhance the international competitiveness, quality and safety of its agricultural products.

3.4 Current foreign technical regulations and standards facing China

This section gives an overview of the foreign environmental technical regulations most applicable to Chinese industries. It also mentions a few international standards that have, in essence, become conditions of doing business in key foreign markets. It focuses exclusively on import regulations from the European Union, the United States and Japan—China's largest export destinations, as described above. Although some of these standards have been in place for decades, most them are relatively recent, and the number and scope of such standards seems to be expanding quickly. For

the most part, foreign environmental technical regulations focus on the quality and characteristics of products rather than their production methods.

3.4.1 Environmental import regulations in the European Union

The Restriction of Hazardous Substances Directive, adopted by the members of the European Union in July 2006, is a regulation affecting all goods sold in Europe, including imports. The directive eliminates the use of certain toxic materials, such lead, mercury, polychlorinated biphenyls (PCBs) and so on (www.rohs.gov.uk). It will force Chinese electronics manufacturers to use environmentally friendly materials if they hope to gain access to European markets.

Although the subject is still under fierce debate in the WTO, the European Union has attempted to ban the import of genetically modified organisms (Crowley, 2008). This could become a significant concern for China, which is already a major grower of genetically modified crops and is planning a US$3.5 billion research and development initiative on genetically modified organisms (Stone, 2008).

European Union import regulations also affect products that contain greenhouse gases such as chlorofluorocarbons (CFCs) or hydrochlorofluorocarbons (HCFCs), various other ozone-depleting substances, asbestos and detergents (Hong Kong Trade Development Council, 2008; European Union, 2008). The European Union is considering implementing a tariff system that would force companies exporting to Europe to buy emission credits, essentially paying for any greenhouse gas emissions in excess of EU standards ("EU ponders carbon," 2008). This proposal is quite progressive and controversial due to its regulation of imports based on their emissions rather than product characteristics, and it may conflict with GATT obligations.

The European Union has also recently created the Registration, Evaluation and Authorization of Chemicals program, a comprehensive regulatory regime for chemicals that includes regulatory control over imports and their chemical contents. Although the program is more focused on the process of accepting and documenting chemicals, it has significant evaluation and authorization components that will restrict manufacturers from exporting products that contain substances of very high concern into the European Union and will require substantial documentation of imported goods and their chemical contents (Chemicals Policy Initiative, 2008).

3.4.2 Environmental import regulations in the United States

In recent years the United States has generally been less active than the European Union in terms of environmental import regulations. At the same time, the United States has mirrored the European Union through a variety of restrictions on chemicals and other characteristics of products allowed for import. The most prominent piece of U.S. legislation regulating imports as a result of environmental concerns remains the Toxic Substances Control Act of 1976. The act works primarily

to create an inventory of chemicals used within the United States, catalogue any new chemicals introduced and assess the potential danger of those chemicals to public health and the environment. However, the act also includes specific regulations on PCBs, asbestos, lead paint and various other substances (U.S. Environmental Protection Agency [EPA], 2008c). Despite these restrictions and regulations of chemical imports, the Toxic Substances Control Act is perhaps less stringent than parallel regulation in Europe. The Federal Insecticide, Fungicide, and Rodenticide Act regulates imports of pesticides, requiring exporters to comply with applicable U.S. pesticide legislation and register with the U.S. Environmental Protection Agency (EPA, 2008b).[5] In addition, the United States has restrictions on a variety of ozone-depleting substances, including CFCs, halons, methyl bromide and HCFCs, in line with its commitments under the Montreal Protocol on ozone-layer protection (EPA, 2008a).

3.4.3 Environmental import regulations in Japan

Recent Japanese environmental technical regulations have also proven to be economically damaging for China, particularly those regarding food sanitation assessment (Fackler, 2007). The most prominent of these measures, the Food Sanitation Act,[6] has made Japan the world leader in the inspection of domestic and imported food products, and has greatly restricted what China can export to Japan. The Food Sanitation Act is less focused on the restriction of specific chemicals than on the stringency of the inspection process. Japan has reported that roughly a third of the 1,515 food samples rejected for import came from China (Fackler, 2007). Due to a recent food scare mitigated by the Food Sanitation Act, the value of Chinese exports to Japan in the first two months of 2008 was down over 10 per cent from the previous year (Shutao, 2008). Japan has also enacted the Electrical Appliance and Material Safety Law, regulating the safety of products from the electronics industry, including the safety of the materials used to make those products.[7] Japan has a variety of other import regulations on fertilizers, feed, pesticides, paints, plastics and rubber products (Japan External Trade Organization, 2008).

3.4.4 Agricultural technical regulations

Many agriculture-related foreign environmental import regulations fall under the WTO's SPS Agreement. The SPS Agreement stipulates that countries can adopt environmental import restrictions relating to human, animal or plant life or health (SPS measures), as long as those technical regulations are based on science and do not act as unnecessary restrictions to trade (World Trade Organization, n.d.). The SPS Agreement allows technical regulations on any agricultural products that might affect consumer health or contaminate the importing nation's environment. The

[5] For a detailed description of the Federal Insecticide, Fungicide, and Rodenticide Act, see http://epa.gov/regulations/laws/fifra.html
[6] For a description of the Food Sanitation Act, see www.jetro.go.jp/en/reports/regulations/pdf/food-e.pdf
[7] For a detailed description of the Electrical Appliance and Material Safety Act, see www.meti.go.jp/english/policy/denan/procedure/guide01.htm#c05-2

SPS Agreement does not cover measures that affect environmental conditions or human, animal or plant health in the exporting countries. Such measures would be covered by the GATT, which imposes a number of hurdles for importing countries to overcome if they want to restrict production practices that cause pollution in China.

China is generally considered to have low SPS standards for domestic producers (and goods imported into China); however, its industries must also comply with the typically much higher SPS standards of the countries to which they're exporting. Thus foreign SPS measures are particularly relevant to China's agricultural industry. Minimal SPS compliance domestically has become a major limiter to the competitiveness of China's agriculture sector, which is now undergoing a major overhaul of its standards regime in order to enable businesses to be in a better position to meet foreign standards (Dong & Jensen, 2004).

3.4.5 *Private and quasi-private international standards that are emerging as conditions of sale in foreign markets*

International standards are not only developed by governments and quasi-public institutions to help harmonize technical regulations among nations and break down barriers to trade, they are also increasingly being developed by civil society groups and multistakeholder coalitions to promote good corporate environmental or social practice. Despite their voluntary origin, some of these private international standards have become de facto conditions of sale in some markets. Other standards that are relatively new to the market are trending in that direction. Although, for the most part, voluntary international standards have not been widely implemented in China, there are currently a handful of standards that are either undergoing rapid uptake in China or that Chinese manufacturers are under increasing pressure to implement. These standards can be divided into three broad groups: environmental standards, social standards and sector-specific standards.

3.4.5.1 Environmental standards

ISO 14000 environmental management standards

The cornerstone of the ISO 14000 series is the environmental management system standard ISO 14001. ISO 14001 has been widely adopted in a variety of industries and countries around the world and has become the dominant environmental management system worldwide. Focusing exclusively on the Plan-Do-Check-Act cycle, also known as the continuous improvement or Deming cycle, ISO14001 carries with it no specific quantitative environmental performance requirements. However, environmental management systems allow corporations to identify environmental liabilities and locate areas in which efficiency is needed or improvement possible; therefore, such systems will encourage the development of better environmental practices. ISO14001 has permeated international corporate practice to such an extent that it is now often seen as a general expectation for trade in certain sectors (Li, 2008). Because of this, it was among the first standards to be implemented across many industries in China.

In the last decade, the rate of ISO 14000 certification in China has increased dramatically. In 1999, 100 organizations in China were ISO 14001 certified; in 2001, 1,000 were certified; in 2005 China had 10,000 certified organizations; and by November 2007 the number had reached 30,489. In 2006 China ranked second globally in its number of organizations that were ISO 14001 certified, with roughly 12 per cent of total global certifications. ISO 14001 is now utilized heavily in a variety of industries and across a broad geographic area. This quick spread throughout China has been voluntary and market driven, demonstrating the standard's substantial economic benefits. ISO 14001 is now so widespread that it is considered a de facto condition of sale in many Chinese industries (Li, 2008).

ISO 9000 quality management systems

An older cousin of the ISO 14000 series is the ISO 9000 series, which is devoted to quality management and assurance, prescribing how quality assurance processes occur and how these processes are documented and adhered to. Waste minimization is a significant component in quality management systems, forming an indirect link to environmental performance. Pressure for ISO 9000 certification in certain industries, such as the automotive, aerospace, chemical and building materials sectors, has been prevalent since the 1990s. A survey by Quality Systems Update recently showed that more than 83 per cent of certified companies polled reported a higher perceived product quality, and 70 per cent reported gaining competitive advantage. A different study, conducted by Dowling College of Long Island, New York, found that 41 per cent of companies using ISO 9000 reported an increase in their European market share. Despite ISO 9000's apparent contributions to product quality and competitive advantage, ISO 9000 compliance is not largely considered mandatory in many markets, though it is a requirement for some regulated products in the European Union (Hutchens, 1999).

Hazard Analysis and Critical Control Point (HACCP)

HACCP is a food safety system that has become the universally accepted method for food safety assurance. HACCP is built around the concept of assuring food safety through the systematic management of processes and production methods rather than limited end-product testing. Like ISO 9000 and 14000, HACCP is a *system* rather than a regulation; compliance provides a way to prevent food hazards but does not contain any quantitative requirements.

Developed in the 1960s for the U.S. space program, HACCP expanded to apply to common food production systems and was widely used voluntarily by industry by the 1970s. Since then it has been endorsed by several international organizations, including the UN Food and Agricultural Organization and the World Health Organization (Goodrich, 2005). The Codex Alimentarius Commission, a prominent international standard-setting body whose standards are the reference point for food safety requirements in international trade, has incorporated HACCP guidelines into all relevant codes on food and hygiene (World Health Organization, 2007). ISO 22000, another international standard for food quality management, also utilizes HACCP (Intertek, 2008). The

U.S. Department of Agriculture has established HACCP regulations in meat and poultry processing plants. The U.S. Food and Drug Administration requires that the canned food, seafood and juice industries follow HACCP, and plans to extend the requirement throughout the food industry (U.S. Food and Drug Administration, 2001). Furthermore, in 2006 the European Union made HACCP compliance a requirement for all facets of food production (Partington, 2006).

HACCP is critical to China, where the expectation for compliance with food safety systems is quite high due to recent contamination scares. By May 2004, 4,600 Chinese food processing and manufacturing enterprises (roughly 29 per cent of China's total) were HACCP certified. In a survey of 27 HACCP-certified Chinese food enterprises, the respondents concluded that the greatest incentives for HACCP implementation were access to new markets, increased product quality and increased market share (Bai, Cheng-lin, Yin-sheng, Shu-kuan & Shun-long, 2007). Therefore, not only has HACCP certification become a condition of sale in China's major export markets, but compliance has been shown to be economically advantageous for Chinese manufacturers.

3.4.5.2 Social standards

Social Accountability 8000

Social Accountability 8000 (SA8000), one of the world's first labour-oriented private standards, was developed by Social Accountability International in the 1990s and is currently being implemented across China as Chinese manufacturers come under increasing pressure from international trading partners to address labour conditions. However, despite growing use in China, it has not yet caught on to the same degree as it has in Western nations. As of September 2008, 225 facilities in China were SA8000 certified (Rochelle Zaid, Accreditation Director, SAI, personal communication, September 24, 2008). Unlike other, similar standards, SA8000 certifies individual facilities rather than companies as a whole. The SA8000 standard is based on the conventions of the International Labour Organization, and therefore includes provisions covering child labour, forced labour, health and safety, freedom of association and the right to collective bargaining, discrimination, disciplinary practices, working hours and compensation (Crijns, 2004). It is not specific to any industry.

ETI Base Code

The Ethical Trading Initiative (ETI), originally formed in the United Kingdom, is a collection of international corporations, NGOs and trade union organizations that promotes worker's rights and deals with other labour concerns. The ETI Base Code lays out the core principles that members must comply with. It emphasizes good social practice along members' supply chains and focuses on freedom of association, overtime, regular employment, health and safety, housing and discrimination. China accounts for 24 per cent of ETI assessments worldwide, with a total of over 1,300 ETI assessments in 2002 alone (Barrientos & Smith, 2006). This number is rising quickly throughout China, especially since the dissolution of the Multi-Fibre Agreement in 2005. Despite the high number of ETI-compliant companies in China, China is considered to have particularly

high rates of non-compliance among official ETI members (Barrientos & Howell, 2006). Although SA8000 and ETI have a wide area of overlap in their standards, they differ primarily in that SA8000 accredits individual facilities, whereas ETI is a company-based standard that mostly works with international corporations and the various components along their supply chains.

ISO 26000

ISO Social Responsibility (ISO 26000), under development, is another social responsibility standard that may apply to China. ISO has a level of visibility in the global community far surpassing Social Accountability International or the Ethical Trading Initiative; therefore, ISO 26000 will almost certainly gain widespread credibility and international recognition on a scale unattainable by other standards. Unlike SA8000 and the ETI Base Code, ISO 26000 is not a set of strict specifications, but rather a collection of qualitative guidelines to help private and public entities better understand and reach good social practice (International Organization for Standardization, 2006). Because of this, ISO 26000 likely will not by itself be a strong driver for assessment of conformity to social responsibility standards. However, it could significantly increase corporations' interest in assessing and understanding their social practices. As an ISO standard, ISO 26000 will be implemented by a vast variety of major corporations worldwide and will therefore become relevant for a significant portion of Chinese industries.

3.4.5.3 Sector-specific standards

Agriculture standards

GlobalGAP is a private sector body that sets voluntary standards for the certification of "good agricultural practices" (GAP) for agricultural products around the globe. The GlobalGAP standard is primarily designed to reassure consumers about how food is produced on the farm, by minimizing the detrimental environmental impacts of farming operations, reducing the use of chemical inputs and ensuring a responsible approach to worker health and safety as well as animal welfare (GlobalGAP, n.d.) . GlobalGAP is perhaps the most prominent comprehensive international standard for agricultural activities and is currently being widely implemented across China, largely as one path through which to comply with the aforementioned sanitary and phytosanitary measures of China's export targets.

Textile standards

The Oeko-Tex Standard 100, an environmental textile certification scheme originating in Europe and specifically focusing on the environmental impacts of the textile and apparel industry, was first established in China in 1999. As of June 2006 Oeko-Tex had 695 certified companies in China alone. The Oeko-Tex Standard 100 deals mostly with toxic effluents such as carcinogenic dyestuffs, pesticides, PCBs, heavy metals and formaldehyde. Though Oeko-Tex was widely adopted in the textile and apparel industry, many manufacturers who subscribed to the standard were not satisfied with its impact on competitive advantage, mostly because of the large number of similar standards

on the international market and the lack of recognition of OEKO-Tex in the international market (Wang, n.d.).

The uptake of Oeko-Tex Standard 100 within Chinese industry pushed the Chinese government to develop its own parallel environmentally oriented textile standard, called HJBZ 30-2000, in 2000. Although HJBZ 30-2000 used Oeko-Tex Standard 100 as a reference, it was an ineffective alternate because of faulty testing and inspection processes and a lack of appropriate testing methodology. As of 2006 only 95 companies nationwide had HJBZ 30-2000 certification, primarily because the standard lacked credibility among overseas buyers—largely due to its less-stringent requirements and lack of accountability measures (Wang, n.d.).

China Social Compliance 9000 for the Textile and Apparel Industry (CSC9000T), established in 2005 by the China National Textile & Apparel Council, is a standard for social responsibility in China's textile and apparel industry that includes both management system requirements and specific regulations. Ostensibly the CSC9000T was created by the Chinese government in order to repair the industry's reputation and thereby increase its competitiveness in the global market (China National Textile & Apparel Council, 2005). However, the standard also served as a way for China to regain control of its own workers' rights, which have been heavily influenced by international standards. The CSC9000T has been criticized on several fronts, including the standard's origins in the Chinese government and the lack of provisions for freedom of association among workers, living wage allowances, or prohibitions against discrimination based on political affiliation or sexual orientation. As of August 2005 the CSC9000T had 170 Chinese participants but only one major investor from outside of China or Hong Kong (Domoney, n.d.). Thus, despite aggressive promotion from the Chinese government, HJBZ 30-2000 and CSC9000T have not gained traction among foreign corporations, due to a lack of stringency and the resulting lack of credibility in international markets.

Mechanical and electronics standards

The Electronics Industry Code of Conduct is an international standard for performance expectations in labour, health and safety, environmental practices, ethics and management systems in the information and communications technology industry (FIAS & Business for Social Responsibility, 2007). The Electronics Industry Code of Conduct was developed by HP, IBM, Dell and others; members now include the majority of major international players in the information and communications technology industry, such as Apple, Microsoft, Adobe, Intel and Cisco (Harder & Commike, 2007). Certification is company-based and applies across members' supply chains. The program is still in its nascent stages; however, it is likely to play a prominent role among standards for the information and communications technology industry in China. The value of certification in increasing competitive advantage has already been demonstrated, and therefore the incentive to comply with the standards is increasing quickly. However, concerns currently exist about the extent

and effectiveness of the auditing process and whether certified companies are adhering strictly to the system's provisions (FIAS & Business for Social Responsibility, 2007).

Forestry standards

The Forest Stewardship Council is an independent multistakeholder initiative focused on designing and ensuring conformity with standards for responsible forest management. Forest Stewardship Council standards promote equitable use and sharing of benefits derived from the forest, reduction of the environmental impact of logging activities as well as maintenance of the ecological functions and integrity of the forest, recognition of and respect for indigenous peoples' rights, maintenance or enhancement of the long-term social and economic well-being of forest workers and local communities, respect for worker's rights in compliance with International Labour Organisation conventions, and appropriate and continuously updated management plans (Forest Stewardship Council [FSC], n.d.b). The Forest Stewardship Council has become the most prominent standard-setting body for the forestry sector in the world, with offices in more than 46 countries (FSC, n.d.a). In 2006 the council launched an initiative in China that marked the first formal steps toward the development of a forest certification scheme within the country (World Wildlife Fund, 2006). Since then, uptake of the council's standards in China has grown dramatically, increasing from just over 50 certificates in 2003 to roughly 130 in 2005 to well over 300 in 2007. By June 2007 FSC had certified more than 700,000 hectares of forest in China (FSC, 2007).

3.4.6 Description of problems in the key sectors

China, as the world's largest developing country, faces a difficult situation in that foreign TBTs have become a big obstacle for foreign trade development after the country's entry into the WTO. According to a survey released by the Chinese Ministry of Commerce, in 2005 about 25.1 per cent of export enterprises in China were affected by foreign TBTs; the direct damage to the country's export economy was US$28.8 billion.[8,9] The total value of shipments affected was above US$8.15 billion, including US$2.22 billion worth of products that did not meet energy-efficiency and recycling requirements and US$1.23 billion in products that did not meet government-imposed standards for protecting the environment protection and safeguarding health and safety. These two types of requirements are the restrictions that most affect China's exports. In 2006 the direct damage was US$35.92 billion, accounting for 3.71 per cent of the total value of exports in 2006. About 31.4 per cent of export enterprises were affected by TBTs to different degrees, an increase of 6.3 per cent over the previous year (AQSIQ, n.d.).[10]

[8] The calculation of "direct damage" mainly includes cancelled orders and costs of rectifying non-compliance.
[9] Based on a survey of 2,996 export enterprises in 31 provinces, municipalities and cities under the direct jurisdiction of the central government published by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (2006).
[10] Based on an AQSIQ survey of 2,570 export enterprises in 31 provinces, municipalities and cities under the direct jurisdiction of the central government.

As China's top three export markets, the European Union, the United States and Japan are the countries with the most TBT-causing measures in the world, and they are also the countries that most restrict China. Different industries in China are affected by these countries' TBTs to different degrees. According to the report *Foreign TBT Measures that Influence China's Foreign Trade in 2005,* released by the Chinese Ministry of Commerce, farm and food products were affected the most seriously by Japan and the European Union, light industry and textiles mainly by the United States and the European Union, and mechanical and electrical products by the European Union.

According to the Chinese Ministry of Commerce's survey, mechanical and electrical products and textiles and agricultural products were most affected by foreign TBT measures. The added cost of mechanical and electrical products increased the most, the direct damage to textiles was serious, and almost all kinds of farm and food products were affected by foreign TBT measures.

The added cost of mechanical and electrical products increased the most

The mechanical and electrical industry is the largest export industry in China. In 2006 exports from this sector were US$549.42 billion, accounting for 56.7 per cent of total export volume. However, compared with developed countries, mechanical and electrical export products from China are mainly low-tech products, lack added value and are often blocked by TBT measures. The cost of export increases quickly. Figures released in 2007 by the Chinese General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ, www.aqsiq.gov.cn) showed that the direct damage to the mechanical and electrical industry from foreign TBT measures was US$8.7 billion in 2006, accounting for 24.2 per cent of the total direct damage in the same year and ranking the sector first among Chinese industries.

For example, the Waste Electrical and Electronic Equipment Directive and the Restriction of Hazardous Substances Directive are the European Union's provisions pertaining to electronic equipment that have most seriously affected China's electronic export products. According to 2006 data from the Chinese Ministry of Commerce, the value of the electronic exports affected by these provisions was US$31.7 billion, US$50 billion and US$60 billion in 2003, 2004 and 2005, respectively. The two provisions not only increased the cost of China's mechanical and electrical products entering the EU market but also led to the loss of the market. Especially for high-tech industries such as the mechanical and electrical industries, the added cost of exporting to the European Union is much higher. China has spent a considerable amount on technology improvement since the European Union enacted the two directives. This caused increases in costs. Statistically, the costs of complying with Category 16 of the customs regulations (which covers imports of mechanical instruments, electronic equipment and spare parts, TV image equipment and so on) increased the most, accounting for 44.1 per cent of the total increased cost.

The direct damage to textiles was serious

Textile exports play an important role in China's foreign trade. The total export volume for textiles has ranked at the top of China's export products for many years. China is still the largest producer and exporter of textiles in world. China's total volume of fibre-processing accounts for about one-quarter of the world total volume, and that of clothing accounts for one-eighth. However, with the expiry of WTO textile agreement on January 1, 2005, textile quotas were cancelled. Foreign countries, especially developed countries, began to protect their markets through setting stricter and stricter TBT measures. All signs indicate that TBT measures have become the major barrier affecting China's textile exports.

From the comprehensive data and statistics provided by the Chinese Ministry of Commerce, the direct damage to the textile industry was US$1.17 billion in 2002, and the direct damage in 2005 was US$29.87 billion, accounting for 43.2 per cent of total direct damage to China's exporting industries that year. Moreover, provisions for environmental textile labels, especially the new Registration, Evaluation, Authorisation and Restriction of Chemical Substances regulation that took effect in the European Union in 2007, affected China's textile exports. This is because during the producing and processing of textiles, almost all the procedures are related to chemicals—especially printing, dyeing and curing—and will create hazardous substances throughout the process. If a chemical used to produce exported clothing is not registered and permitted by the European Union, that clothing would be forbidden for sale in Europe. We can estimate that after the implementation of the new regulation, about 70 per cent of Chinese clothing exports have been affected because of these chemical processes.

Agricultural products were widely influenced

As the world pays more attention to the rights of consumers to protect their lives and health, foreign countries, especially developed countries, have begun to use stricter TBT measures on agricultural products in order to control residual pesticides and ensure product quality. This presents much higher demands for the packaging, labelling and allowable residues for agricultural products. All of these measures have placed unprecedented limitations on China's exports of agricultural products.

According to research by the Chinese Ministry of Commerce, agricultural products were influenced most widely by TBT measures in 2005 (Ministry of Commerce of the People's Republic of China, n.d). Although the absolute value wasn't high, the value of the direct loss to the agricultural sector—calculated based on the value of cancelled offers and additional costs related to the cancellations—was equivalent to 26.7 per cent of the value of that sector's total exports in 2005. The ministry estimates that when these direct losses are combined with the value of potential additional contracts that were lost because of TBT measures—a form of loss the ministry calls "opportunity loss"—the total damage in 2005 reached 96.6 per cent of the actual value of the sector's exports. In 2006, 90 per cent of China's agricultural and food export industries in China were affected by TBT measures, causing direct losses of US$14 billion.

It is useful to provide some specific examples of typical cases. Beginning in January 2002, the European Union comprehensively forbade the importation of Chinese animal-derived products because of residues of chloromycetin and other pesticides that could not meet the EU standards, except for ocean-caught fish that were exported directly to Europe. This prevented more than US$1 billion in exports from shipping from China to the European Union. Although the injunction on animal-derived products had been partially dismissed by the European Union in August 2004, the ban on poultry products wasn't lifted until September 2005. Outside the European Union, the implementation of a "positive list system" in Japan in 2006 also increased the threshold for exports of China's agricultural products. Japan is the largest market for China's agricultural exports, taking 32 per cent of the country's exports. The implementation of the positive list system affects one-third of China's agricultural exports, including eel, stem vegetables and honey, for which pesticide residues exceed the limits. As a third and final example, ISPM 15, a common regulation covering the wood packaging of import products, is followed all over the world. ISPM 15 requires that wood packing have no bark and be heat- or vacuum-treated according strict standards, requirements that also restrict the packaging for Chinese agricultural products.

After the country's entrance to the WTO, Chinese export enterprises began to react to foreign TBT measures to different degrees. Most export enterprises know that the key way to overcome foreign TBTs is to improve technology and management as well as international competitive ability. According to a survey by the Ministry of Commerce in 2005, in order to overcome foreign TBT, 71.8 per cent of enterprises try to improve technology and meet the standards of international or import countries; 63.4 per cent try to strive for authentication by international authorities and exporting countries. In addition, export enterprises also make use of many other ways of overcoming foreign TBT, such as bilateral negotiation; the WTO dispute settlement system; participation in the amendment of national and international or importing countries' standards.

Although Chinese export firms have the basic skills needed to overcome foreign TBT, their ability is still limited because of their own low product and research technology level, the need for improvement in the services delivered by government and social organizations, and the high requirements posed by international standards. The main problems are listed in Table 3.1.

Table 3.1 Chinese exports firms' main barriers to overcoming technical barriers to trade.

Problem	Proportion of export firms affected (%)
Lack of funds, difficulties altering technology and gaining international authentication	50.7
Unavailability of information about whether competitors' regulations have changed	43.7
Lack of transparent procedures; when firms are treated inequitably, they don't know which department to ask for help	41.5
Lack of technological assistance; when firms are faced with the high requirements of international standards, they cannot get technological assistance from certain departments	40.8
Large gap between the technology possessed and the technology level needed to meet the technical requirements of trading partners	31.7

Source: Ministry of Commerce of the People's Republic of China (n.d).

From Table 3.1 we can see that lack of funding is the biggest difficulty for export firms. This leads to a low level of production technology and low product standards because of the lower level of economic development compared with that in developed countries and the absence of a mechanism that can inspire firms to add inputs to technology and product innovation. Inability to acquire timely information is the second most important difficulty, because international standards change quickly and requirements are continually increasing; the government's system for releasing information on international standards is not consistent. The third and fourth difficulties reflect the need for improvement in the service functions of government and social organizations. The last difficulty reflects that because of the overall low technology standard in China, the gap between national and international standards is great.

3.5 China's standards regime

According to the Standardization Law of the People's Republic of China, implemented on April 1, 1989, China's standards regime includes national standards, industry standards, local standards and enterprise standards. National standards and industry standards can be divided into mandatory standards and recommended standards.

After China's entry into the WTO, according to the provisions of related WTO agreements and State Council provisions, the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) became responsible for all the policies and procedures related to assessment of standards compliance. AQSIQ is expected to notify the WTO Secretariat about the WTO, TBT and

SPS measures set by AQSIQ, appraise and consult on TBT and SPS measures set by other members of the WTO, and formulate provisions to deal with other WTO members' suggestions regarding AQSIQ's TBT and SPS measures. The Standardization Administration of the People's Republic of China is responsible for implementing the TBT Agreement and SPS Agreement under the arrangement and coordination of AQSIQ.

Since imports into China that are affected by technical trade measures are varied and distributed across several industries, at least 15 departments are involved in formulating and implementing the technical trade measures, and related committees and trade organizations also play important roles.

3.5.1 Measures the Chinese government takes to help enterprises meet the relevant standards

In order to help export enterprises overcome foreign TBT measures, AQSIQ, as the government department responsible for leading on issues related to TBTs, takes the following measures with other member units (such as the Ministry of Commerce and the Ministry of Agriculture). The first of these is to collect the latest TBT measures formulated and revised by WTO members; send them to the relevant industries, departments, associations and enterprises; evaluate the measures in various ways and send suggestions to the involved WTO members. The second is to engage in bilateral and multilateral exchanges, discussions, consultations and negotiations with related WTO members about the TBT measures that negatively affect China's enterprises. The third is to formulate and complete a warning system that deals with provisions such as Japan's positive list system and the European Union's Registration, Evaluation, Authorisation and Restriction of Chemical Substances regulation, as well as its standard for non-food products. Fourth, AQSIQ must research key foreign TBT measures, offer informational consultation and organize various forms of training. Finally, it influences public opinion through all kinds of media.

Information released

Since 2006, AQSIQ has published an annual report on TBTs affecting China. The report comprehensively investigates the TBT measures that China has come across in the previous year. It also summarizes the situation that China is dealing with for some TBT measures. Meanwhile, it also introduces the TBT measures that China itself has formulated and revised. This report offers a detailed introduction of the trends, experiences and practice of foreign countries' formulation and revision of TBT measures.

The *Foreign Market Access Report* has been released by the Ministry of Commerce annually since 2005. *Suggestions for Encouraging Enterprises to Overcome TBT Measures* was published jointly by the Ministry of Commerce and AQSIQ. These two reports not only introduced the implementation of TBT measures for China's main trading partners but also offered some guidance to export enterprises dealing with TBT measures.

Domestic standards perfected

In 2002 the Chinese government began to pay more attention to perfecting the Product Quality Management System and TBT Measures System. China continually improved the level of domestic standards and narrowed the gap between international standards and Chinese standards. For example, the Chinese government set up the same quality certification and accreditation system that developed countries had adopted. China founded the China National Accreditation Board and the China Import and Export Inspection Laboratory Authorization Committee according to this advanced system. Meanwhile, China announced TBT and SPS measures to the WTO: as of September 2008 China had submitted 499 TBT measures and 120 SPS measures. The full text of these technology measures has been available on the website of China's Standardization Administration since October 14, 2005.

International standards appraised

China evaluated other WTO members' TBT measures to assess effects on Chinese export firms and make suggestions for improvement, focusing on Japan's positive list system and the European Union's Registration, Evaluation, Authorisation and Restriction of Chemical Substances regulation; Restriction of Hazardous Substances Directive; Waste Electrical and Electronic Equipment Directive and Energy-Using Products Directive. These appraisals efficiently protected the interests of export enterprises.

For example, in 2005 Japan's Ministry of Health and Welfare announced to the WTO the positive list system, which limits the residues of agricultural chemicals on food. This system was launched in November 2005 and had a good chance of affecting Chinese export agricultural products and food values by US$7 billion. The involved agencies in China submitted an appraisal to Japan and opened bilateral and multilateral negotiations. Japan partially accepted China's suggested amendments. At the same time, the related departments coordinated harmoniously and examined many kinds of ways of dealing with the system in order to minimize its negative effects.

3.5.2 The current status of the response of Chinese enterprises to the standards

When foreign TBTs restrict Chinese exports, enterprises have to increase their inputs in order to meet world market requirements. This increases costs and reduces international competitive advantages. Chinese enterprises passively improve their products' standards in three main ways: the first is to invest in improving technology levels, green standards and working conditions; the second is to purchase advanced production equipment and more precise inspection equipment; and the third is to invest heavily in getting authentication from the related international body or importer.

Chinese enterprises do not participate in the establishment of national standards because of the absence of an inspiring mechanism inside the government and enterprises. The current situation leads two consequences. In the international market, Chinese enterprises participate at a low rate in

the establishment of international standards, so they must follow the standards set by foreign multinational companies. In the domestic market, the organizations mainly involved in establishing various standards are academies and colleges directed by government. Enterprises also rarely participate in these, so the established national standards cannot always meet the needs of the export enterprises.

3.5.3 *The current status of the Chinese government's participation in the construction of international standards*

China participates in the construction of international standards and relevant activities in four main ways: first, through direct participation in the establishment and amendment of international standards; second, by taking part in ISO's relevant work; third, by undertaking various activities and tasks for ISO; and fourth, by undertaking international bilateral cooperation for the development of international standards for other countries to meet when they trade with Chinese firms.

Through the end of 2006 China had been involved with the creation of 55 international standards, including 39 ISO standards and 16 International Electrotechnical Commission standards, and was involved with an additional nine standards compared with 2005.

Through the end of 2006 China had also taken part in the work of 13 ISO technical committees and subtechnical committees, and Chinese representatives occupied 23 chair, vice-chair, secretary and associate secretary positions, three more than in 2005. So China's participation in international standards activity has borne substantial fruit.

In 2006 China undertook many ISO activities and tasks, including participating in various important meetings and forums (see Table 3.2) and making use of the organization's basic databases, such as the international standards glossary database, which includes 117,000 items.

Table 3.2 ISO activities undertaken by China in 2006.

Date	Place	Name
May 8–12	Beijing	22nd annual session of the ISO graphical symbols of standardization administration committee
May 22	Beijing	8th forum of the International Electrotechnical Commission advisory committee on safety
May 21–25	Beijing	Annual session of ISO technical committee 37, on terminology and other language and content resources
December 14	Hong Kong	World telecom exhibition of the International Telecommunication Union

Source: China Institute of Standards (2007).

In the field of international bilateral cooperation, China has established friendly cooperation with countries such as Germany, the United States, Japan, Korea, the United Kingdom and Canada. Through the end of 2006 China had subscribed to 19 cooperation agreements and memos with different countries.

Above all, since China joined the WTO, the country has made breakthroughs in participating in international standards, which benefit not only the development of Chinese standards but also the world's understanding of Chinese standards.

4.0 Current trends and lessons from international experience

The previous section made it clear that many of China's exporters face difficulties in conforming to international standards and technical regulations and that those difficulties involve significant costs. This section surveys the trends in regulations and standards and argues that according to those trends, the situation for China's exporters will only get more difficult.

4.1 Trends in international trade, environmental regulations and consumer expectations

Several noteworthy international trends have relevance for China's exporters:

More stringent foreign import regulations. Though few current foreign environmental import regulations present insurmountable economic challenges for Chinese manufacturers, many countries are beginning to tighten their environmental regulations. As discussed above, Japan, one of China's biggest export destinations, has recently made food sanitation laws much more stringent (Fackler, 2007). The European Union has begun to call for the "greening" of international trade rules and has initiated efforts to turn its own environmental regulations into international standards. The European Union's tough domestic measures on environmental issues have given it a reliable defence against criticisms that its import standards and regulations are protectionist, and Europe is therefore uniquely positioned to enact such changes in international policy (Kelemen, 2007). If Europe succeeds in making international environmental standards more stringent, this will inevitably increase the number of environmental regulations that Chinese businesses will have to comply with, as well as increase the environmental performance levels manufacturers will have to achieve in order to maintain access to key markets.

Consumer demand for "green" products. In the last decade, consumer demand for green products in many of China's most important export markets, such as the United States, the European Union and Japan—and even in China itself—has increased dramatically. This certainly includes consumer concerns about public health issues related to the products themselves, but also includes consumer concerns about social and environmental impacts associated with the way products are produced. The number of consumers in the United States and the United Kingdom who actively seek out green products is roughly 20 per cent of the total population and is on the rise. In western Germany this figure has risen to nearly half the population (Hong Kong Trade Development Council, 2005). This demonstrates the significant potential competitive advantage provided by superior environmental performance and the inevitability of the enactment of further international environmental standards (public and private) geared toward differentiating superior performance.

"Greening" of corporate supply chains. Largely in response to the growing consumer demand for green products and corporate social and environmental responsibility, multinational corporations have begun to take greater strides to ensure the environmental responsibility of their suppliers, many of which are Chinese (Simms, 2006). *Supply Chain Digest* listed greening of the supply chain as the most prominent trend in supply chain management in 2006 (Gilmore, 2006). Some of the world's largest companies, including Walmart, Coca-Cola, Starbucks and dozens of others, have begun to implement comprehensive sustainable supply chain management plans (Simms, 2006). Such companies will look to existing international standards where they exist, or else will develop their own standards. Regardless, green supply chain policies will force many Chinese manufacturers to adopt corporate environmental standards in order to continue their status as corporate suppliers. In this respect, corporate social responsibility and supply chain policies have already and will continue to become conditions of sale for many Chinese manufacturers. Furthermore, since these supply chain mandates will be company driven, they will not be subject to WTO law and thus can include any number of stipulations based on processes and production methods, such as, for example, greenhouse gas emissions and water efficiency.

Proliferation of private standards. Environmental standards in the last decade have increasingly spawned from voluntary private initiatives (Haufler, 2008), such as the Forest Stewardship Council, the Marine Stewardship Council, the Global Reporting Initiative guidelines and fair trade. The proliferation of such private standards significantly changes the economic landscape for Chinese businesses, as compliance with such standards is often carried out through private conformity assessment systems rather than by utilizing China's domestic, government-run conformity assessment system. China's strategy to date has been to block wide-scale uptake of such private, third-party certification schemes, though it's questionable whether such an approach will allow China to achieve its long-term trade policy objectives, including improving Brand China. Conversely, driving compliance with such private schemes may significantly increase Chinese manufacturers' ability to comply with more mainstream (and easier-to-meet) technical regulations through increased environmental proficiency and the efficiency gains associated with integrated management systems and the harmonization of programs, indicators and terminology.

4.2 Literature review of economic and environmental benefits of environmental standards and regulations

Some recent research (for example, Porter and van der Linde [1995], Hart [1995] and Dowell, Hart and Yeung [1999]) has demonstrated a link between environmental standards and good financial performance. Dowell et al. (2000) showed that firms that adopted stringent environmental standards had much higher market values than firms adhering to less-stringent standards, refuting the viability of the "race to the bottom" theory. More recently, Maertens and Swinnen (2006) showed that Senegalese exports to the European Union grew sharply over a ten-year span, in parallel with the

European Union's stringent food standards put in place at the beginning of that period. A 2005 report by the Network of Heads of European Environment Protection Agencies (2005) found that 51 of 60 studies reviewed by its researchers demonstrated a positive link between responsible environmental management and financial performance. It should be noted that such competitive advantage and increased market share will not apply to all sectors and all companies. Furthermore, different environmental standards have varying degrees of credibility and market value. Chinese industries must be selective in their compliance, analyzing which standards are most relevant and beneficial to their environmental management and business plans.

Many companies have responded that environmental standards and regulations have often increased production efficiency and decreased costs, often through the creation of new innovations. In response to environmental standards, Ciba-Geigy made process improvements that saved $740,000 annually. 3M saved $120,000 in capital investment costs and $15,000 annually by using water-based solutions instead of solvents. The Robbins Company saved nearly $300,000 in capital costs and more than $115,000 annually by implementing a closed-loop system (Porter & van der Linde, 1995). Although these savings are significant, such calculations do not take into account the cost of compliance, which for some will result in net costs over the short term. One report argues that the costs of compliance with environmental regulations (in this case covering a variety of chemicals such as asbestos, CFCs, sulfur dioxide and benzene) are in almost all cases well below cost estimates, usually less than half of what is predicted, and in some cases, considerably smaller than even that (Hodges, 1997). Further research in the United Kingdom has shown that waste minimization resulted in savings equal to 7 per cent of profits in 2000. Waste-reduction investments were found to pay themselves off within no more than a year. The same study showed that businesses in the United Kingdom could save up to the equivalent of nearly €2.7 billion (equivalent to over US$3.8 billion) through energy efficiency (Network of Heads of European Environment Protection Agencies, 2005). Despite these savings, some firms have more potential to reduce production costs than others. Furthermore, the cost of compliance varies greatly and is much higher for companies that have high energy costs, few available technological improvements, foreign competitors taking advantage of low environmental regulations and so on. For this reason, compliance will be less practical for some in terms of short-term economic viability.

The adoption of environmental standards can also reduce business risk. Feldman, Soyka and Ameer (1996) showed that corporate environmental improvements led to a reduction in perceived and actual business risks and were often accompanied by a roughly 5 per cent increase in stock price. They argued that environmental management can be justified entirely on financial grounds. A different report demonstrated that environmental governance reduced business risk and that low environmental risk was a significant determining factor for investment from financial institutions (Network of Heads of European Environment Protection Agencies, 2005). However, business investments in risk reduction reach a point of diminishing returns. Therefore, companies must

individually analyze the economic utility of each standard from a business-risk perspective, weighing the cost of compliance with the degree of anticipated risk reduction.

Environmental standards also lead to considerable indirect economic benefits through improved public health. The report from the Network of Heads of European Environment Protection Agencies (2005) shows that improved environmental performance decreases the amount of money governments spend on social services. The European Commission has estimated it can cut the costs of air pollution by the equivalent of US$58 billion to US$135 billion every year at a cost of roughly US$10 billion per year. This report also argues that improved public health will improve workers' productivity and participation in national economies over their lifespans. Although such improvements to public health and workforce productivity are inherently valuable, they have not been analyzed purely from an economic cost-benefit perspective.

Chinese industries are currently limited in their knowledge of their own costs of compliance and the applicability and usefulness of specific standards to their business strategies. Chinese firms and policy-makers need to better understand the sector-level dynamics of environmental standards in China in order to determine where standards can be most effectively implemented and what barriers to compliance exist for various sectors.

5.0 Policy options for China

Based on the preceding analysis, we offer the following policy recommendations aimed at helping Chinese firms and policy-makers better address the challenges and opportunities of international standards.

5.1 Improve China's domestic standards regime

The analysis in this paper has made it clear that a strong link exists between China's domestic standards regime and the ability of its exporters to meet foreign standards. It has also shown how meeting international standards can further sustainable development in China by reducing environmental and human health impacts and increasing competitiveness and economic growth. Therefore, we recommend that the government undertake the following actions to improve China's domestic standards regime:

- *Strengthen domestic quality standards.* Particularly in areas such as health, safety and environmental protection, China must aim to have domestic standards that approach or conform to standards set by international standard-setting bodies and by importers. This is rightly AQSIQ's task . To be effective, such standards must accompany a drive to improve enforcement of those standards, including augmenting the resources available, the legal remedies in place and the technical expertise of law enforcement.
- *Improve communications with producers.* Chinese enterprises need more timely and accurate information if they are to comply with domestic standards. AQSIQ should establish advanced systems to communicate new and existing standards to producers, including web-based technologies and other outreach efforts, building a network of communication with domestic producers.
- *Improve China's capacity to assess and review foreign standards.* An essential role of China's standards regime is to protect Chinese exporters from unfair or inappropriate foreign standards. It does this at present by reviewing and assessing proposed and existing standards and, where appropriate, suggesting changes (which are in many cases adopted). This system needs to be strengthened by increasing the budget and resources allocated, increasing interdepartmental cooperation and involvement of exporters and trade associations in the review (as recommended below), and learning from the practice of foreign review and assessment.

5.2 Enhance exporters' ability to meet foreign standards

The ability to meet foreign standards is critical to the competitiveness of China's exporters. Without this fundamental ability, China's export trade will not be able to play its full role in fostering sustainable development through economic growth. Meeting high standards can also pay dividends in environmental improvement and social benefits for workers and consumers. We therefore recommend that the Chinese government take the following steps to enhance the ability of exporters to meet foreign standards:

- *Improve the ability of exporters to know the prevailing standards in their export markets.* This involves first being aware of existing standards, then being proactive in collecting and updating relevant information on standards and the technologies available to meet them. And it involves an active campaign to disseminate this to the industries that need it, employing the same sorts of advanced communications technologies used and networks developed in the domestic context.
- *Upgrade the availability of accredited testing and certification in China.* The Chinese government should invest heavily in the construction and equipping of testing and quarantine facilities, the training of technicians, and the process of foreign accreditation for testing bodies within China. It should do so in consultation with exporters that can ensure that their needs are being met.

5.3 Strengthen interactions with private sector exporters

The challenge of helping China's exporters better meet foreign standards is not something that the government alone can do. The Chinese government, the industry associations and the individual firms that export from China need to have a strong partnership. The various elements of that partnership, some of which have already been described above, are listed below.

Government should:

- Actively gather information on existing foreign and international standards. Under the TBT and SPS rules foreign governments are required to notify China's AQSIQ of new standards, but many existing standards and some new standards still are unknown, particularly those propounded by private buyers and those created as voluntary standards. AQSIQ should maintain a web-based, easily searchable and continuously updated database of such standards.
- Actively create a network of industry associations and exporting firms. AQSIQ should create this fundamental basis for the interaction with the private sector, which should be a comprehensive network of exporting firms and be continuously updated.
- Disseminate information on standards, both domestic and foreign, to the network.

- Seek comments and input from the network on standards being proposed by foreign countries (technical regulations) and by buyers and international organizations (voluntary standards), and relay any concerns and questions to the appropriate contacts.
- Run technical training courses for industry organizations or firm representatives on the international law as it relates to TBT and SPS, and on the rights that those agreements confer on exporters and exporting countries.
- Request assistance from developed countries, as necessary and as allowed for under TBT rules, in meeting foreign TBT measures and in setting up the regime to do so.

Industry associations should:

- Set up leaders, departments and personnel to take charge of interactions with the government and work on standards generally.
- Relay information that they gather about standards to AQSIQ for inclusion in the database.
- Contribute comments and questions on new and proposed standards when they are asked for input.
- Alert AQSIQ to any difficulties they encounter with foreign standards.

Individual enterprises should:

- Strengthen their relationships with industry associations and with AQSIQ.
- Relay information that they gather about standards to AQSIQ for inclusion in the database.
- Contribute comments and questions on new and proposed standards when they are asked for input.
- Alert AQSIQ to any difficulties they encounter with foreign standards.
- Adopt international and advanced foreign standards to meet the demands of the international market. To take one example of this kind of successful initiative, in an effort to inform its own development, production and testing of export goods, Haier Group has collected 2,400 standards, tracked and researched the relevant standards of international organizations and exporters in cooperation with technology standardization institutions, established an enterprise standards database, and analyzed and compared China's standards with the ISO standards and national standards of countries such as the United States, Europe, the Middle East and Russia.

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